The 7000 Series Bus Converter

User's Manual

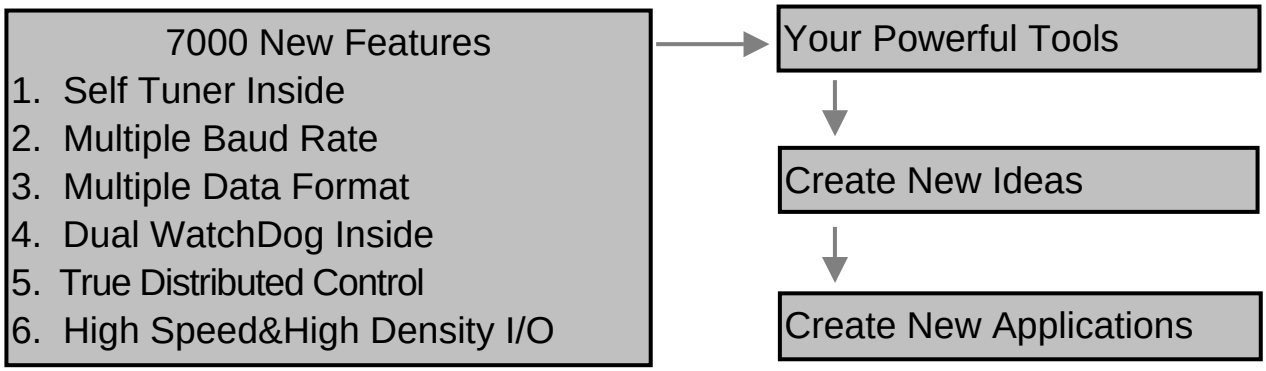

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Table of Contents

1. Introduction 4
1.1 The 7000 series overview 4
1.2 Related Documentation for the 7000 Series 5
1.3 Common Features of the 7000 Series 6
1.5 7000 Dimension 9
2. I-7520/A/R/AR, PCISA-7520AR, PCISA-7520R 11
2.1 I-7520: 11
2.1.1 Pin Assignment and Specifications: 11
2.1.2 Block Diagram 11
2.2 I-7520R: 12
2.2.1 Pin Assignment and Specifications: 12
2.2.2 Block Diagram: 12
2.3 I-7520A: 13
2.3.1 Pin Assignment and Specifications: 13
2.3.2 Block Diagram: 13
2.4 I-7520AR : 14
2.4.1 Pin Assignment and Specifications: 14
2.4.2 Block Diagram: 14
2.5 PCISA-7520AR Pin Assignment and Specification: 15
2.6 PCISA-7520R Pin Assignment and Specification: 16
2.7 Basic Wire Connection for I-7520: 17
2.8 How to select 7520 / 7520R 18
3. USB series: I-7560 / I-7561 / I-7563 22
3.1 I-7560 Pin Assignment and Specifications: 23
3.1.1 The I-7560 System Network Configuration: 24
3.1.2 Block Diagram: 24
3.1.3 I-7560 Driver Installation 25
3.1.4 Verifying the Installation: 29
3.1.5 Uninstalling the Device Driver 32
3.2 I-7561 Pin Assignment and Specifications 33
3.2.1 The I-7561 System Network Configuration: 34
3.2.2 The I-7561 Block Diagram: 34
3.2.3 I-7561 has four different output types. 35
3.2.4 I-7561 Driver Installation 36
3.2.5 Verifying the Installation: 40
3.2.6 Uninstalling the Device Driver 43

3.3 I-7563 Pin Assignment and Specifications: 44
3.3.1 The I-7563 System Network Configuration: 45
3.3.2 The I-7563 Block Diagram: 45
3.3.3 I-7563 Driver Installation 46
3.3.4 Verifying the Installation: 50
3.3.5 Uninstalling the Device Driver 53
4. RS-232 to RS-232 Converter : I-7551 54
4.1 I-7551 Pin Assignment and Specifications: 54
4.1.1 The I-7551 System Network Configuration: 55
4.1.2 The I-7551 Block Diagram: 55
4.1.3 I-7551 has two different output types.. 56
5. Repeater series: I-7510 / I-7510A / I-7510AR / I-7513 57
5.1 I-7510: 57
5.1.1 Pin Assignment and Specifications: 57
5.1.2 Block Diagram: 57
5.2 I-7510A: 58
5.2.1 Pin Assignment and Specifications: 58
5.2.2 Block Diagram: 58
5.3 I-7510AR: 59
5.3.1 Pin Assignment and Specifications: 59
5.3.2 System Network Configuration: 60
5.3.3 Block Diagram: 60
5.4 I-7513: 61
5.4.1 Pin Assignment and Specifications: 61
5.4.2 System Network Configuration: 62
5.4.3 Block Diagram: 62
5.5 Basic Wire Connections for I-7510 63
6. 7000 RS-485 Networking 64
6.1 Standard/Isolation Configuration 64
6.2 PLC Networking Applications 68
6.3 PC Networking Applications 69
6.4 RS-232 Devices Network 70

1. Introduction

The 7000 series is a family of remote controllable data acquisition modules. They provide A/D, D/A, DI/O, Timer/Counter, MMI and other functions. These modules can be controlled remotely by a set of commands.

1.1 The 7000 series overview

The 7000 series can be divided into several groups based on their function as follows:

Group 1: bus converter modules, support bus converter & repeater

- 7520/7520R/ISA-7520R/PCISA-7520R: RS-232 to RS-485 converter, 3000V isolation.
- 7520A: RS-232 to RS485 and RS-422 converter, 3000V isolation.
- 7520AR/PCI-7520AR: RS-232 to RS485 and RS-422 converter, 3000V isolation.
- 7560: USB to RS-232 converter.
- 7561: USB to RS-232/422/485 converter, 3000V isolation.
- 7563: USB to 3-Channel 485 converters, 3000V isolation.
- 7510: RS-485 to RS-485 repeater, 3000V isolation
- 7510A: RS-485 and RS-422 repeater, 3000V isolation
- 7510AR: RS-485 and RS-422 repeater, Two-way 3000V isolation
- 7551: RS-232 to RS-232 Converter
- 7513: One RS-485 to three channels RS-485 Hub

Group 2: DIO modules, support TTL, isolated DIO, relay & O. C. Output

- 7041: isolated DI, 14*in
- 7042: isolated O. C. DO, 13*Out
- 7043: No isolated O.C. 16 channels digital output.
- 7044: high driver O.C. output I + isolated DI, 4*In+8*Out
- 7050: TTL IO, 7*In, 8*Out
- 7052: isolated DI, 8*in
- 7053: Non-isolated DI, 16*In
- 7060: isolated DI & relay output, 4*In+4*Relay
- 7063: isolated DI *8 & 3 form A power relay.
- 7065: isolated DI *4 & 5 form A power relay.
- 7066: 7 form A PhotoMOS Relay
- 7067: Relay output, 7*Relay

Group 3: DA module, support voltage/current output.
7021: 1 channel analog output.
7022: 2 channel analog output.
7024: 4 channel analog output.
Group 4: AD modules, support voltage/current/thermocouple/RTD measurement
7011/7011D/7011P: single-channel thermocouple measurement
7012/7012D/7012F: single-channel large signal measurement
7013/7013D: 1 channel RTD measurement
7033/7033D: 3 channels RTD measurement
7014D: Analog/Transmitter input with LEDs display
7016/7016D/7016P: Strain Gauge input with LEDs display
7017/7018F: Input Range and multi-channel same as 7012.
7018: Thermocouple input, multi-channel 7011
Group 5: Timer/Counter modules: 7080, 7080D
Group 6: Man Machine Interface: MMICON=240*64 LCD+4*4 KBDs+8*function key
Group 7: Power relay Modules:
RM104/108/116: 4/8/16 channels of form-C, SPST, 400V AC, 16A
RM204/208/216: 4/8/16 channels of form-C, SPDT, 400V AC, 5A
Group 8: Embedded Processor module
7188, 7188XA, 7188XB, 7188XC, 7188EX, 7188EA
Group 9: wireless modem module: SST-288
Group 10: Power supply module
ACE-540A: 24V/2A power supply
DIN-540A: ACE-540A with DIN-RAIL mount
PWR-24/220V: 220V AC input, 24V/0.1A output power adapter
PWR-24/110V: 110V AC input, 24V/0.1A output power adapter

1.2 Related Documentation for the 7000 Series

- NAP7000S User Manual: for software NAP7000S, utility program source
- NAP7000P User Manual: for software NAP7000P, DLL driver for 7000
- NAP7000D User Manual: for software NAP7000D, DDE driver for 7000
- NAP7000L User Manual: for software NAP7000O, OLE driver for 7000
- 7000 Bus Converter User Manual:
  For 7510/7520/7520A/7520R/7561/7510A/7520AR/ISA-7520A/ PCI-7520AR/PCISA-7520R
- 7000 DIO User Manual: for 7050/7052/7053/7060/7041/7042/7044/7067
- 7000 A/D Group1 User Manual: for 7017/7018/7013/7013D/7033/7033D
- 7000 A/D Group2 User Manual: for 7011/7011D/7012/7012D/7014D

- 7000 D/A User Manuals: for 7021, 7022, and 7024.
- 7000 Timer/Counter User Manual: for 7080D
- 7000 Embedded Controller User Manual: for 7188
- MMICON Hardware Manual: for MMICON
- MMIDOS User Manual: for MMICON software
- Application Note: EM001 → for MMICON evaluation

1.3 Common Features of the 7000 Series

Isolation voltage: 3000 VDC
Communication:

- Asynchronous half-duplex 2-wire RS-485 network
- Max. Distance without repeater= 1.2Km
- Speed=1200,2400,4800,9600,19200,38400,57600,115200
- Connecting 256 modules in one RS-485 bus without repeater
- Multiple baud rate and multiple data format can share the same RS-485 bus (7520/7510)
- Different baud rate and the same module address can share the same RS-485 bus
- Connecting 256*8=2048 modules max. In one RS-485 bus with repeater.
- 7000 series data format=1 start + 8 data + 1 stop + no parity = 10-bit
- Two extra checksum bytes can be enable/disable
- Built-in transient voltage suppresser and PTC protector
- Sharing the same RS-485 bus with the RS-485 or RS-232 device, which communicates in multiple data format (not 10-bit) and multiple bauds Rate. (Use 7520 to convert RS-232 to RS-485)

Power requirement:

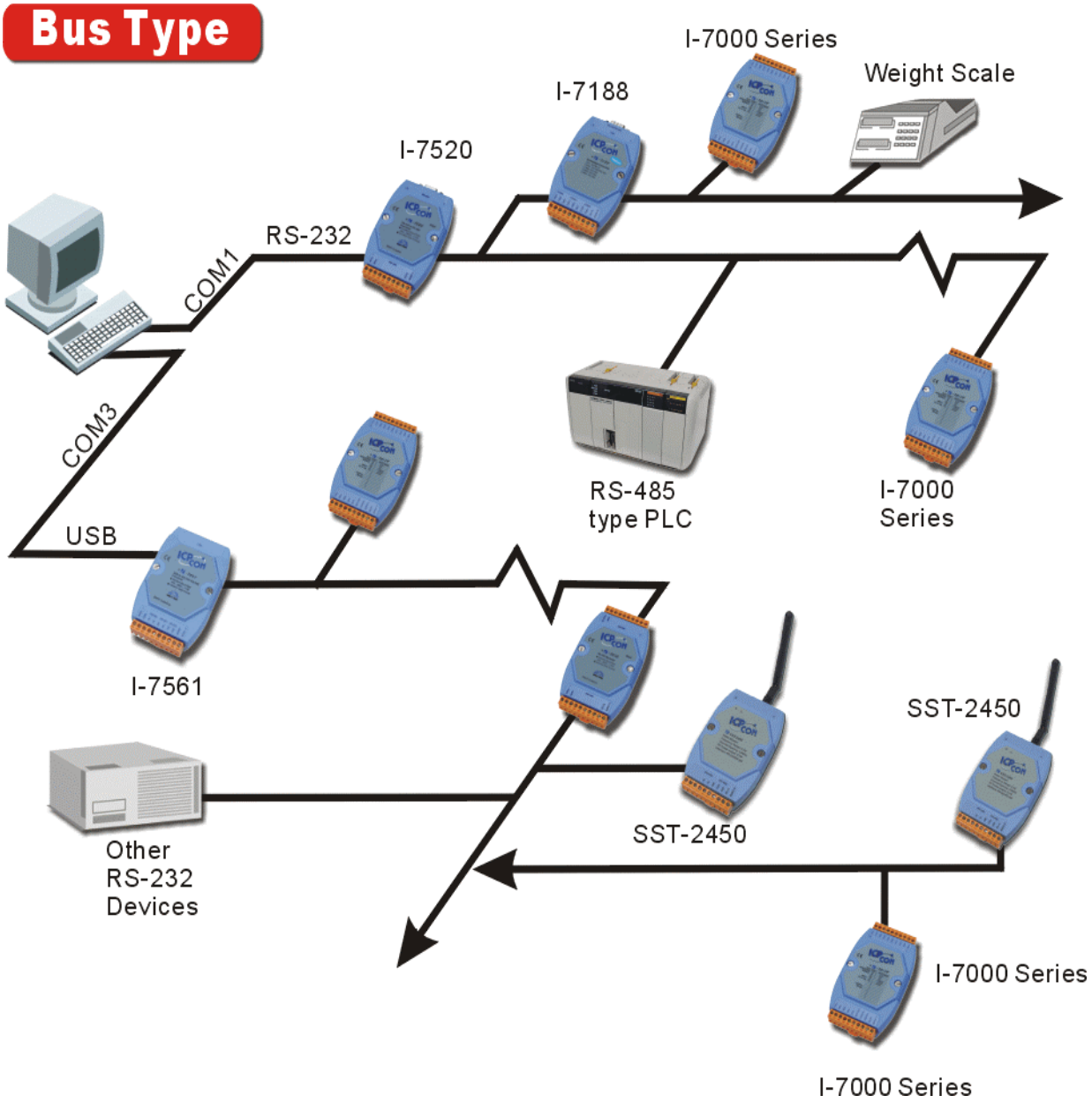
- Unregulated +10V dc ~ +30V dc.
- Power reverse protection, Over-voltage brown-out protection

System:

- Dual watchdog inside, power-on start value and safe value for host failure
- Operating temperature: -25 to 75°C (14 to 185°F)
- Storage temperature: -25 to 80°C (-13 to 185°F)
- Humidity: 5 to 95%, non-condensing

1.4 The 7000 Series System Network for Bus Type

- Multiple Baud Rate
- Multiple Data Format

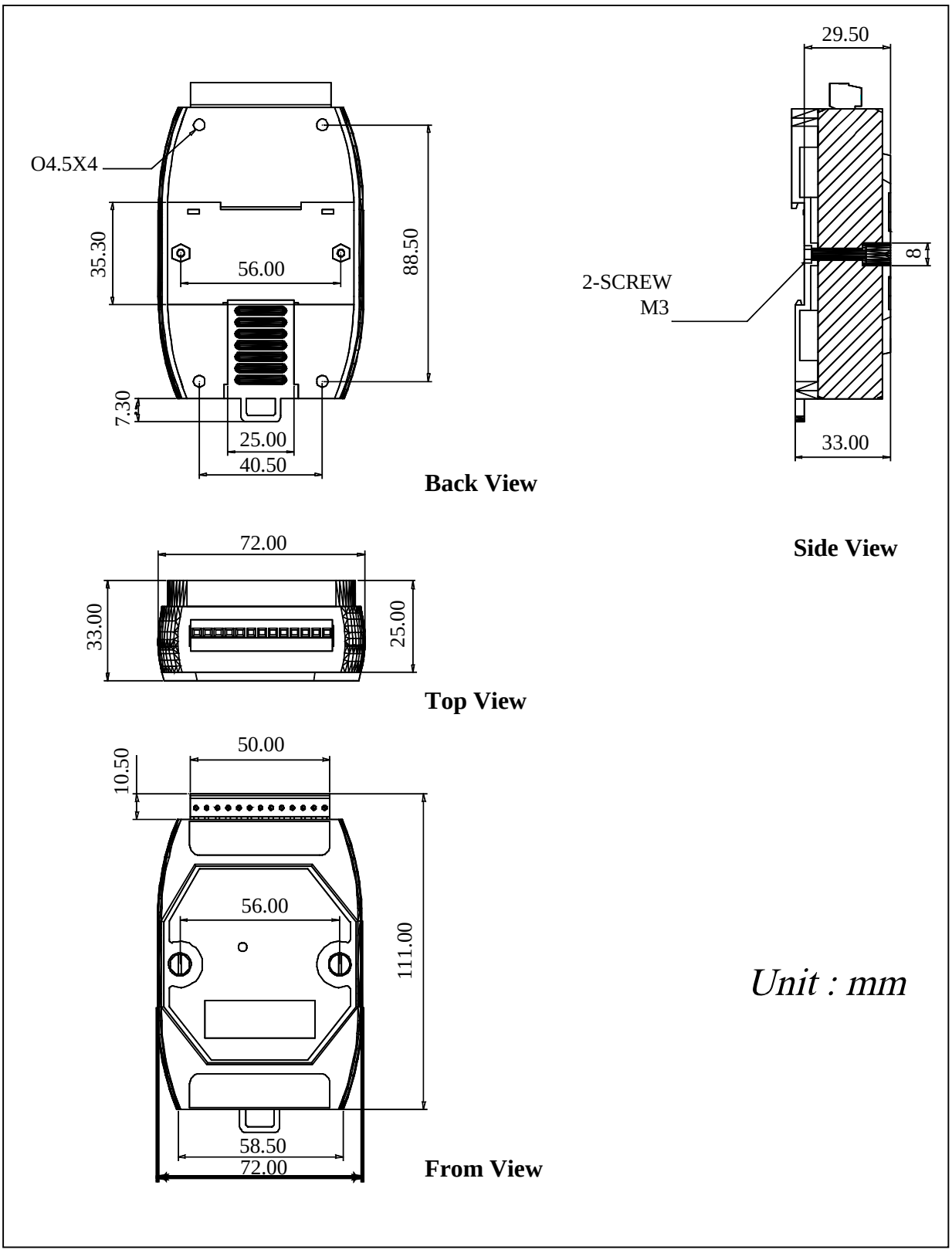


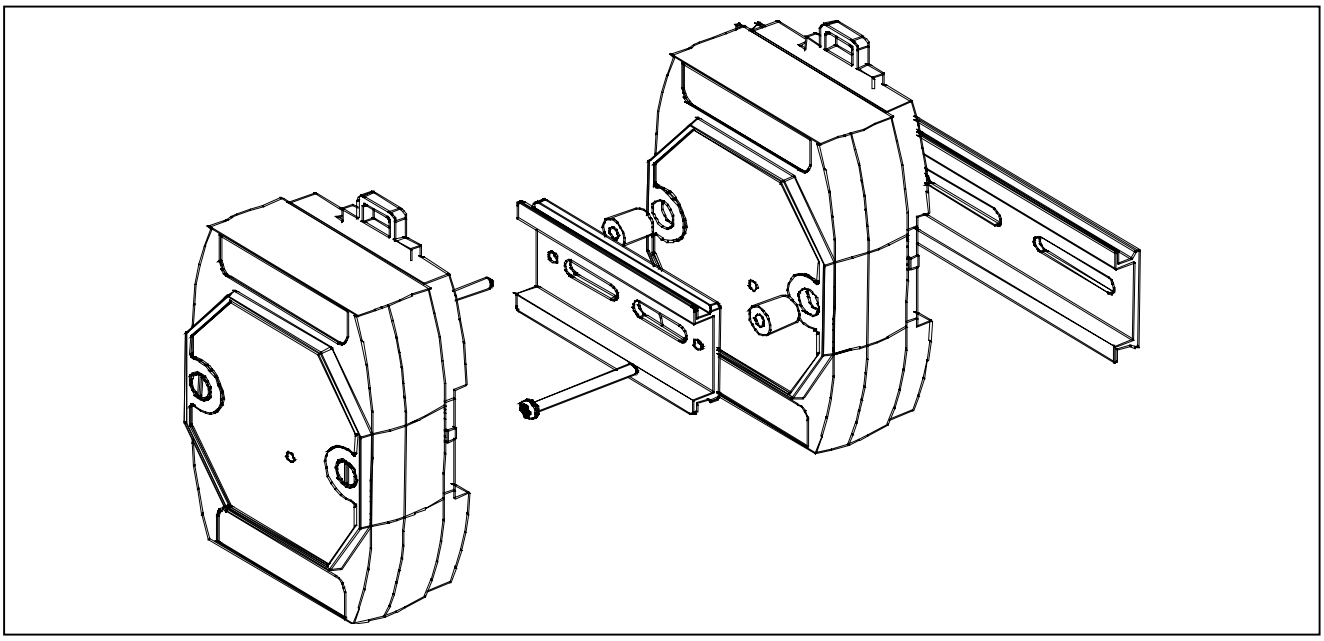
Conventional Two-Wire RS-485 Network: The conventional two-wire RS-485 network uses a DIP SWITCH selectable converter to convert host RS-232 or USB signals to a two-wire RS-485 signal. The baud rate and data format must be set to a fixed value for the whole network. For example, the user can choose baud rate=9600 and data format=10 bit per character. This limitation is inconvenient for some real world applications. The 7000 series, Adam 4000 series, Nudam 6000 series and DATAFORTH 9B series all use a 10-bit format. Some conventional PLCs use an 11-bit data format and some weight scale equipment uses 12-bit. If the host-PC needs to send commands to remote modules, PLCs and weight scale equipment, one possibility is to use three independent two-wire RS-485 networks. However, this may increase system cost and reduce system reliability.

Another option for real world applications is to use many modules in the same two-wire RS-485 network. Each module must communicate at the same baud rate in a conventional system. Some module may be very close to the host-PC and will be able to communicate at a higher baud rate. Other modules may be farther away from the host-PC and will communicate at a lower baud rate. Since only one speed is valid in an RS-485 network, the higher speed modules should be forced to communicate at a lower speed baud rate. In other words, the performance of the entire system must be decreased.

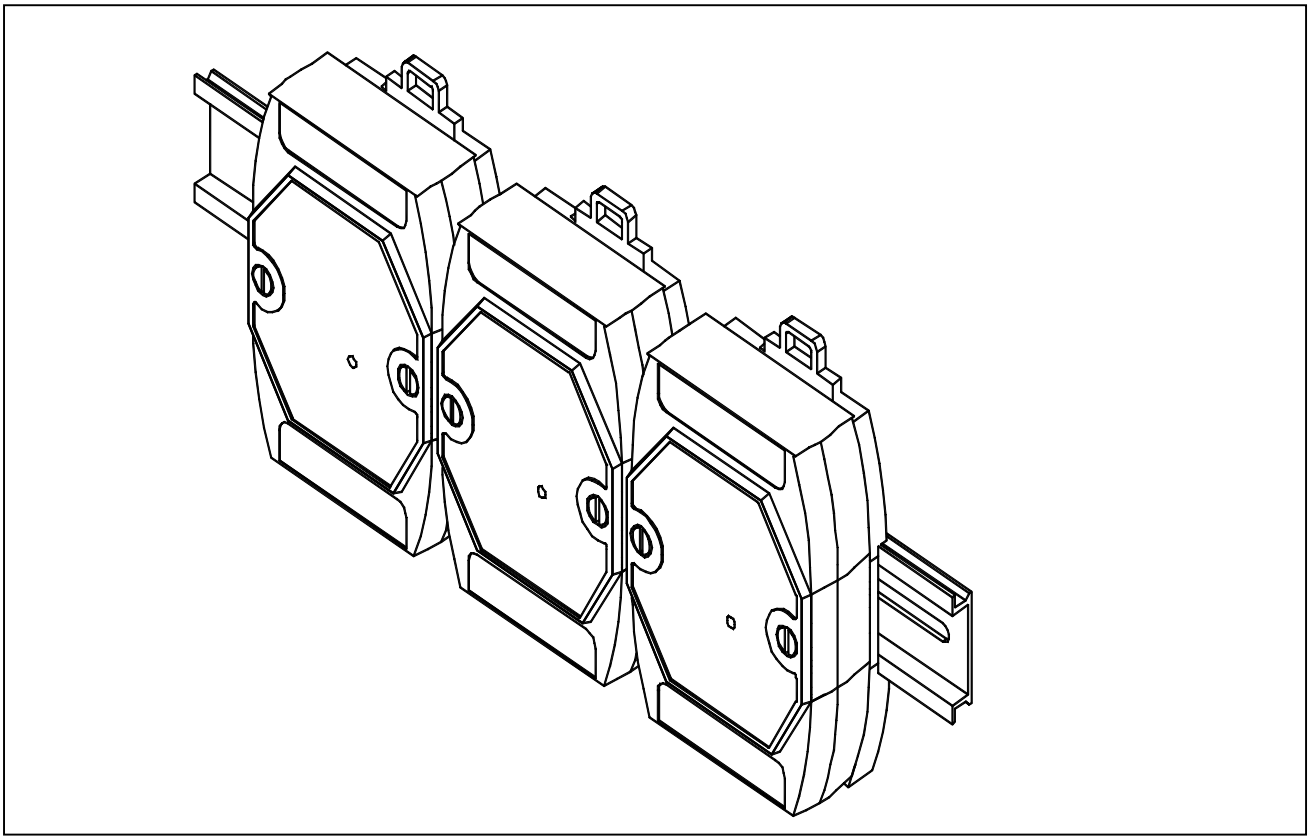
The 7000 Series RS-485 Network: The 7000 RS-485 network is the most powerful and flexible two-wire RS-485 networks in the world. It is a multiple baud rate and multiple data format network system. That is to say, all the remote modules mentioned above, PLCs and weight scale equipment share the same RS-485 network. The 7520, RS-232 to RS-485 converter, equips a “Self Tuner” inside, therefore it can detect the baud rate and data format automatically and control the direction of the RS-485 network precisely. Therefore the user can connect all this equipment to the same RS-485 network. This method will greatly reduce system cost and increase reliability.

1.5 7000 Dimension





Stack Mounting

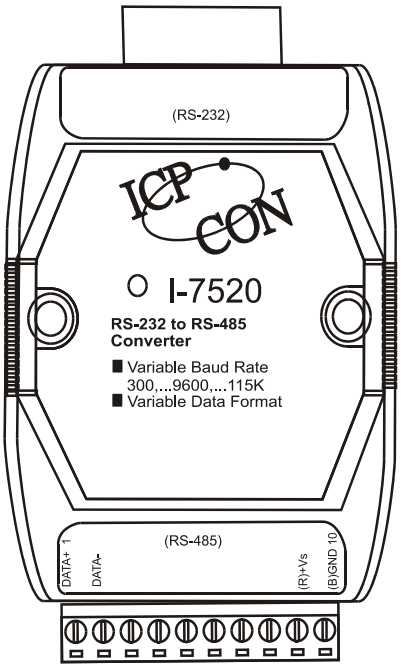


Din – Rail Mounting

2. I-7520/A/R/AR, PCISA-7520AR, PCISA-7520R

2.1 I-7520:

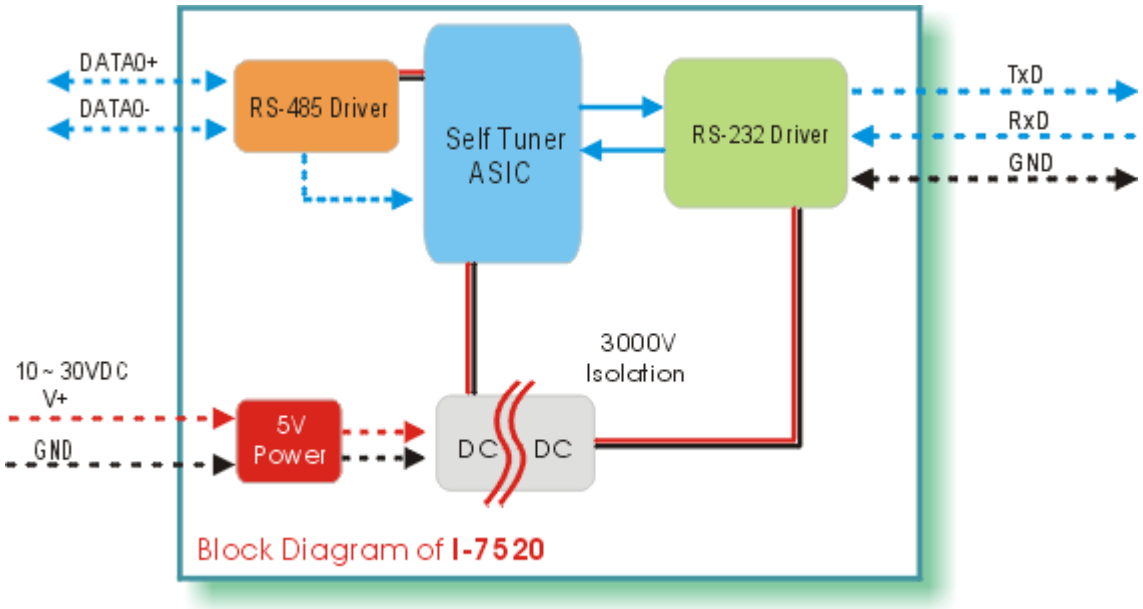
2.1.1 Pin Assignment and Specifications:



7520: RS-232 to RS-485 Converter

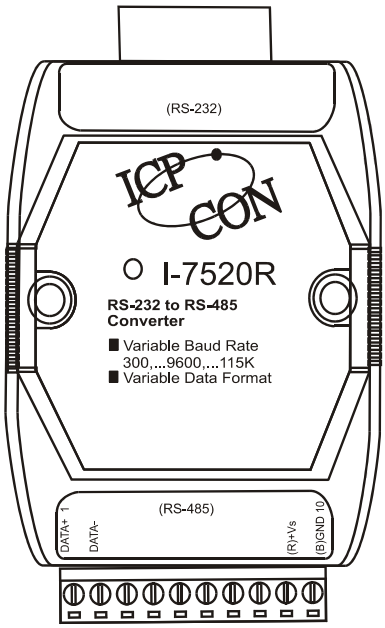
- Protocol: Differential 2-wire half-duplex RS-485
- Connector: plug-in screw terminal block
- Speed: “Self Tuner” inside, auto switching baud rate, from 300 to 115200 bps
- 256 modules max in one RS-485 network without repeater
- 2048 modules max in one RS-485 network with repeater
- Isolation voltage: 3000V
- Isolation site: RS-232
- Repeater request: 4,000 feet or over 256 modules
- Power requirements: +10V dc ~ +30V dc
- Power consumption: 2.2W(Max)

2.1.2 Block Diagram



2.2 I-7520R:

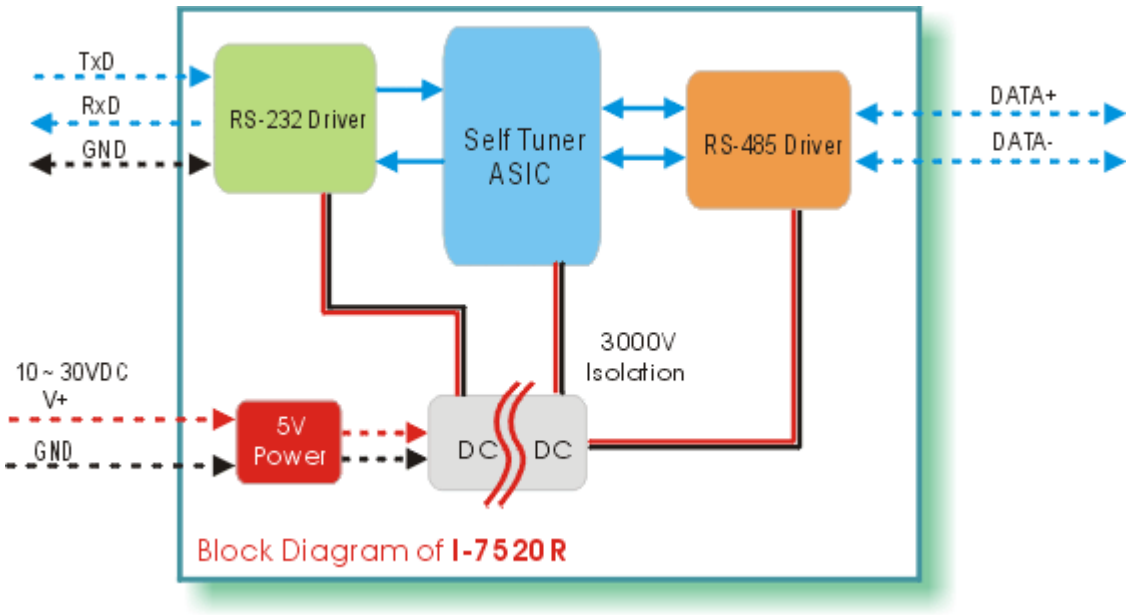
2.2.1 Pin Assignment and Specifications:



7520R: RS-232 to RS-485 Converter

- Protocol: two-wire RS-485, (D+, D-), protocol
- Connector: plug-in screw terminal block
- Speed: “Self Tuner” inside, auto switching baud rate, from 300 to 115200 BPS
- 256 modules max in one RS-485 network without repeater
- 2048 modules max in one RS-485 network with repeater
- Isolation voltage: 3000V
- Isolation site: RS-485
- Repeater request: 4,000 feet or over 256 modules
- Power requirements: +10V dc ~ +30V dc
- Power consumption: 2.2W(Max)

2.2.2 Block Diagram:



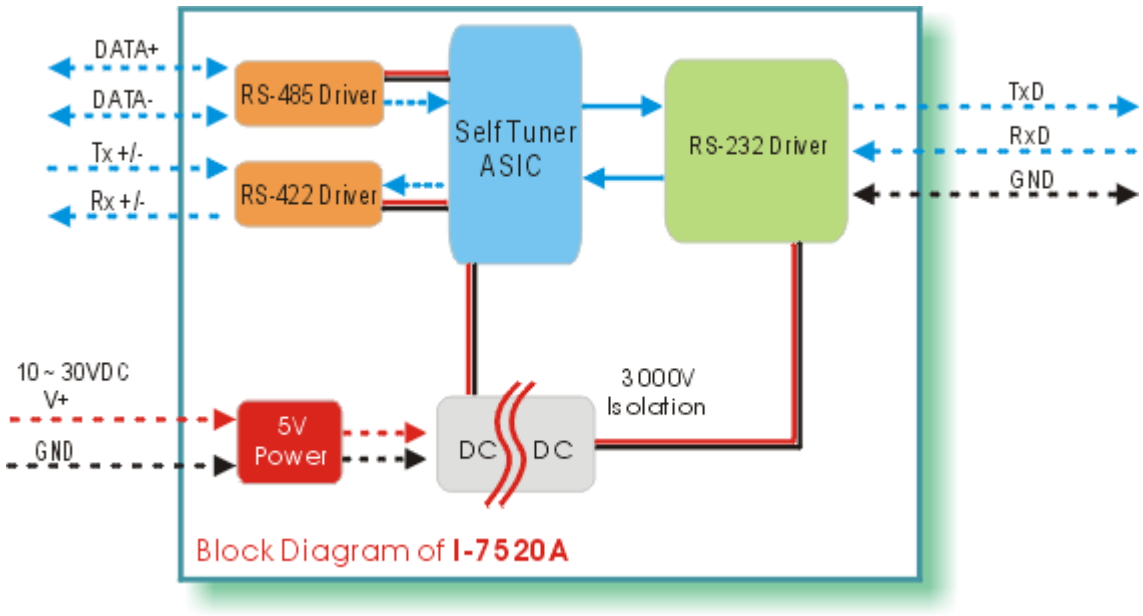
2.3 I-7520A:

2.3.1 Pin Assignment and Specifications:

7520A: RS-232 to RS-422/485 Converter

- Protocol: RS-422/485
- Connector: plug-in screw terminal block
- Speed: “Self Tuner” inside, auto switching baud rate, from 300 to 115200 BPS
- 256 modules max in one RS-485 network without repeater
- 2048 modules max in one RS-485 network with repeater
- Isolation voltage: 3000V
- Isolation site: RS-232
- Repeater request: 4,000 feet or over 256 modules
- Power requirements: +10V dc ~ +30V dc
- Power consumption: 2.2W(Max)

2.3.2 Block Diagram:



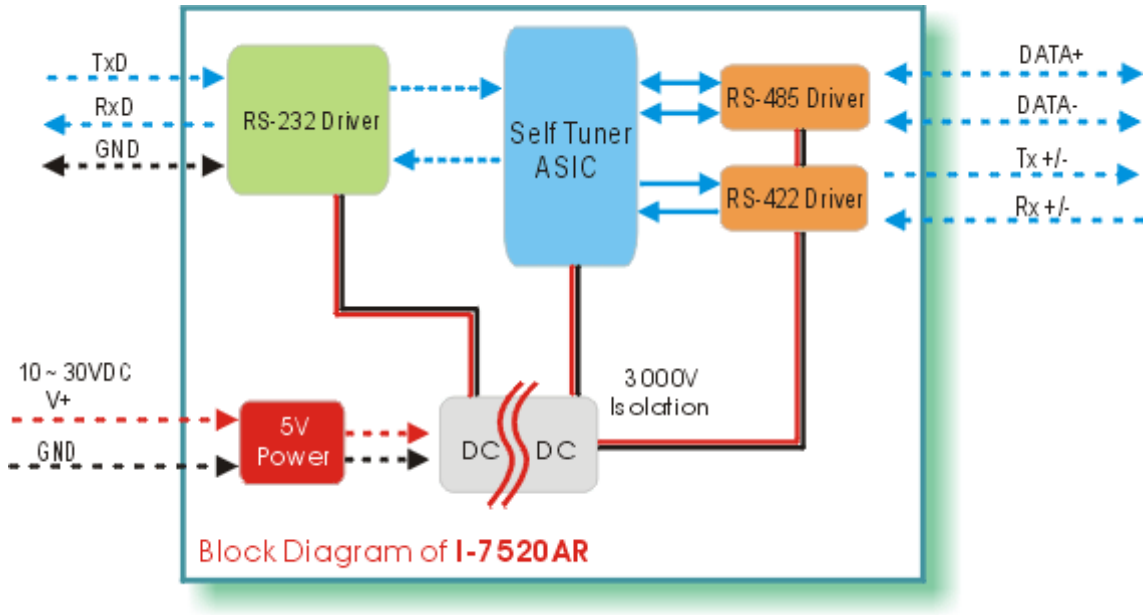
2.4 I-7520AR :

2.4.1 Pin Assignment and Specifications:

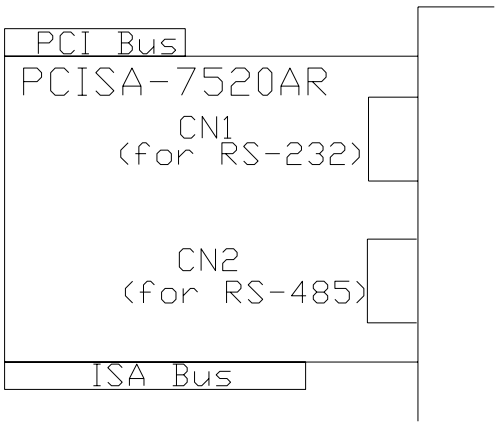
7520AR: RS-232 to RS-422/485 Converter

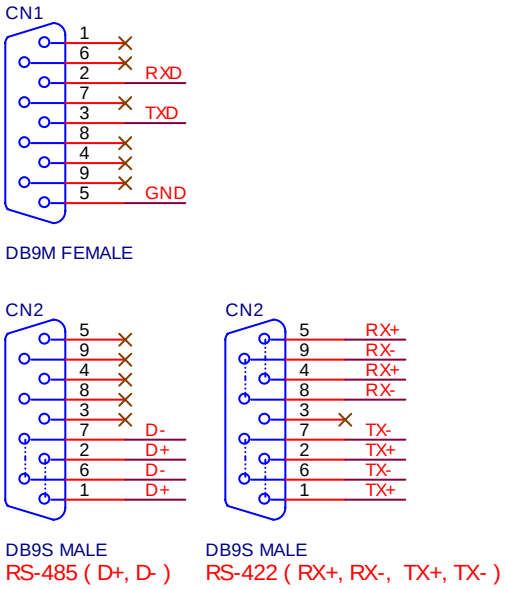
- Protocol: RS-422/485
- Connector: plug-in screw terminal block
- Speed: “Self Tuner” inside, auto switching baud rate, from 300 to 115200 BPS
- 256 modules max in one RS-485 network without repeater
- 2048 modules max in one RS-485 network with repeater
- Isolation voltage: 3000V
- Isolation site: RS-422/485
- Repeater request: 4,000 feet or over 256 modules
- Power requirements: +10V dc ~ +30V dc
- Power consumption: 2.2W(Max)

2.4.2 Block Diagram:



2.5 PCISA-7520AR Pin Assignment and Specification:



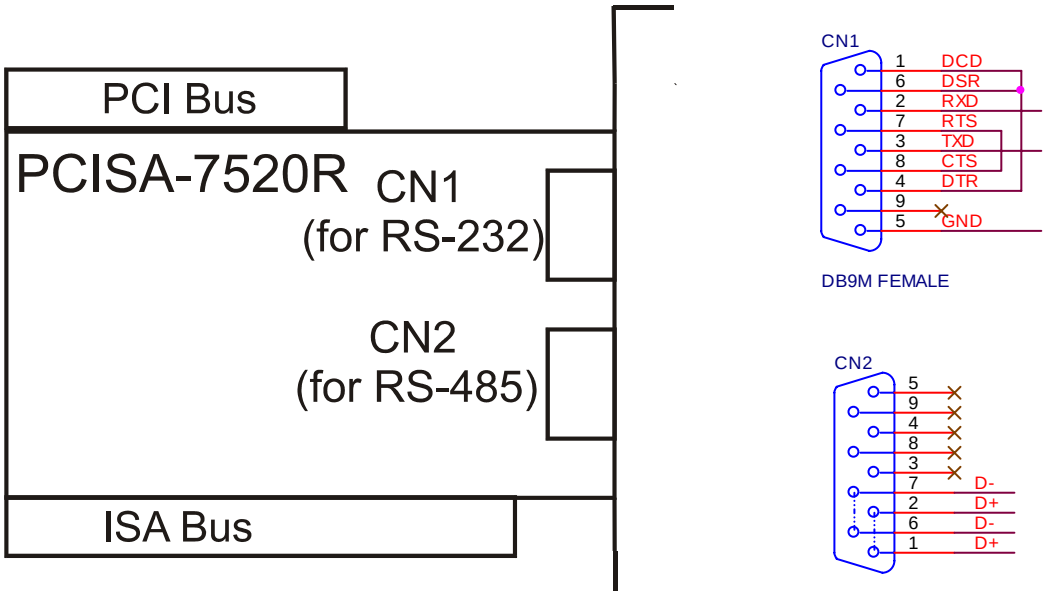


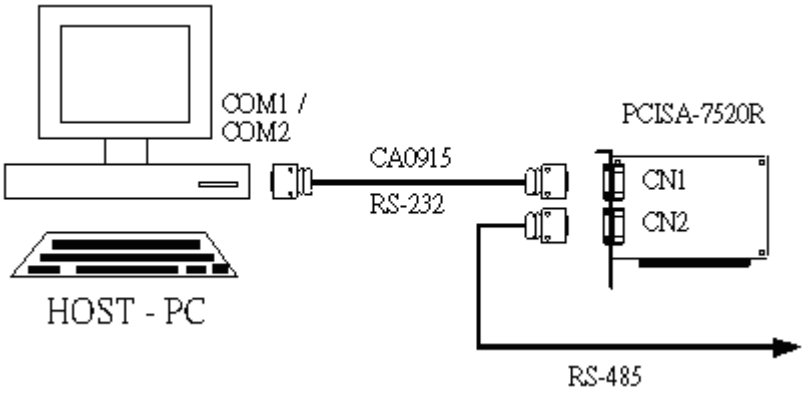
CON2: RS-485/422 DB9 Male Connector

Terminal	2-wire RS-485	4-wire RS-422
1	DATA+	TX+
2		
3	Not Connect	
4	Not Connect	RX+
5		
6	DATA-	TX-
7		
8	Not Connect	RX-
9		

The PCISA-7520AR is exactly the same as 7520AR except for the PCI and ISA interface. It is designed for easy installation.

2.6 PCISA-7520R Pin Assignment and Specification:





CON2: RS-485 DB9 Male Connector

Terminal	2-wire RS-485
1	DATA+
2	
3	Not Connect
4	
5	
6	DATA-
7	
8	Not Connect
9	

The PCISA-7520R is exactly the same as 7520R except for the PCI and ISA interface. It is designed for easy installation.

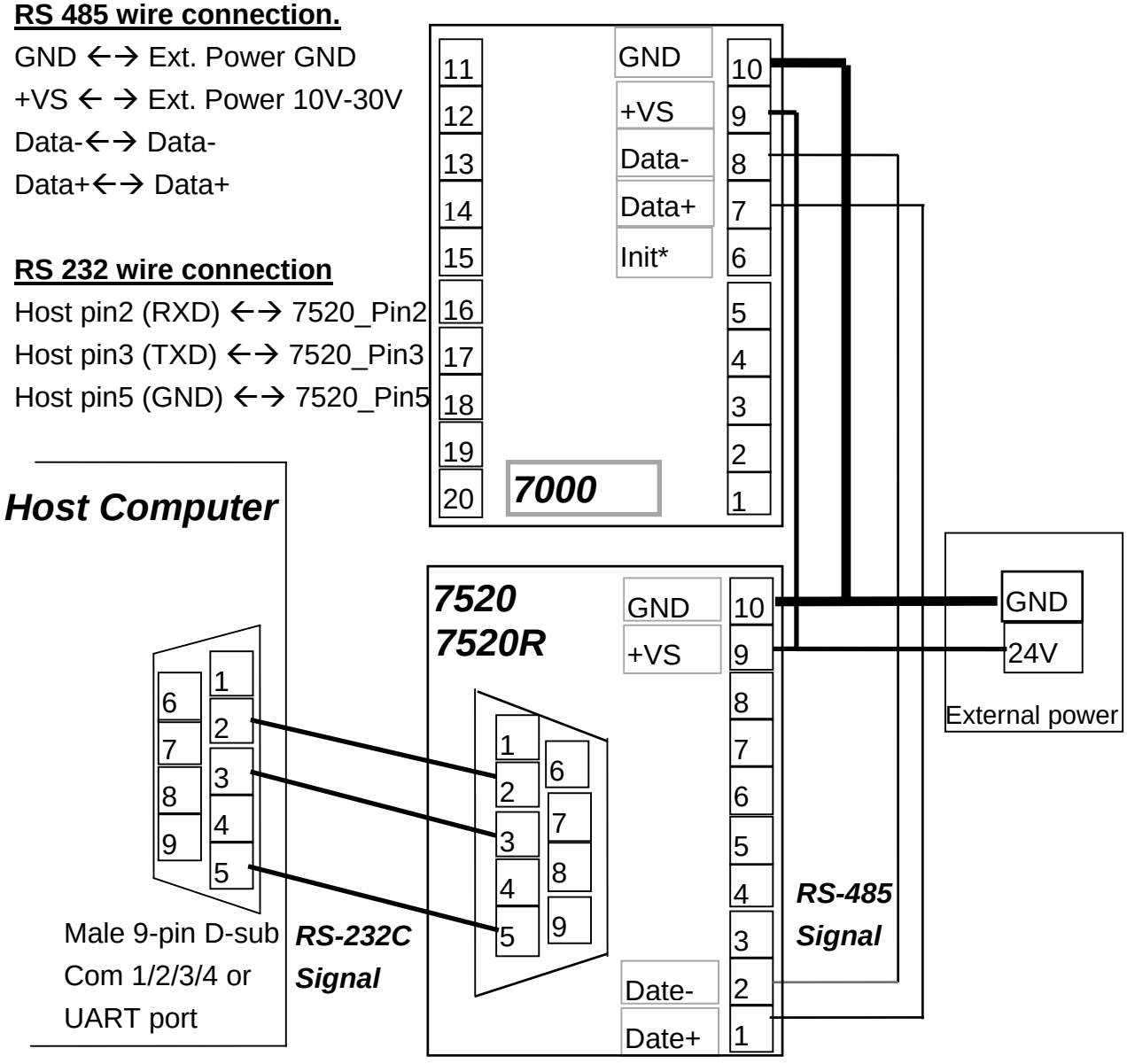
2.7 Basic Wire Connection for I-7520:

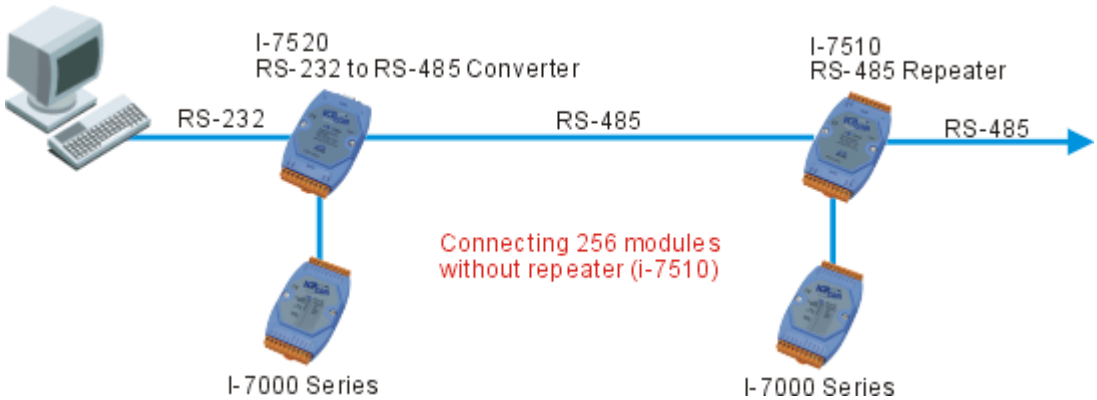
RS 485 wire connection.

GND ←→ Ext. Power GND
+VS ← → Ext. Power 10V-30V
Data-←→ Data-
Data+←→ Data+

RS 232 wire connection

Host pin2 (RXD) ←→ 7520_Pin2
Host pin3 (TXD) ←→ 7520_Pin3
Host pin5 (GND) ←→ 7520_Pin5

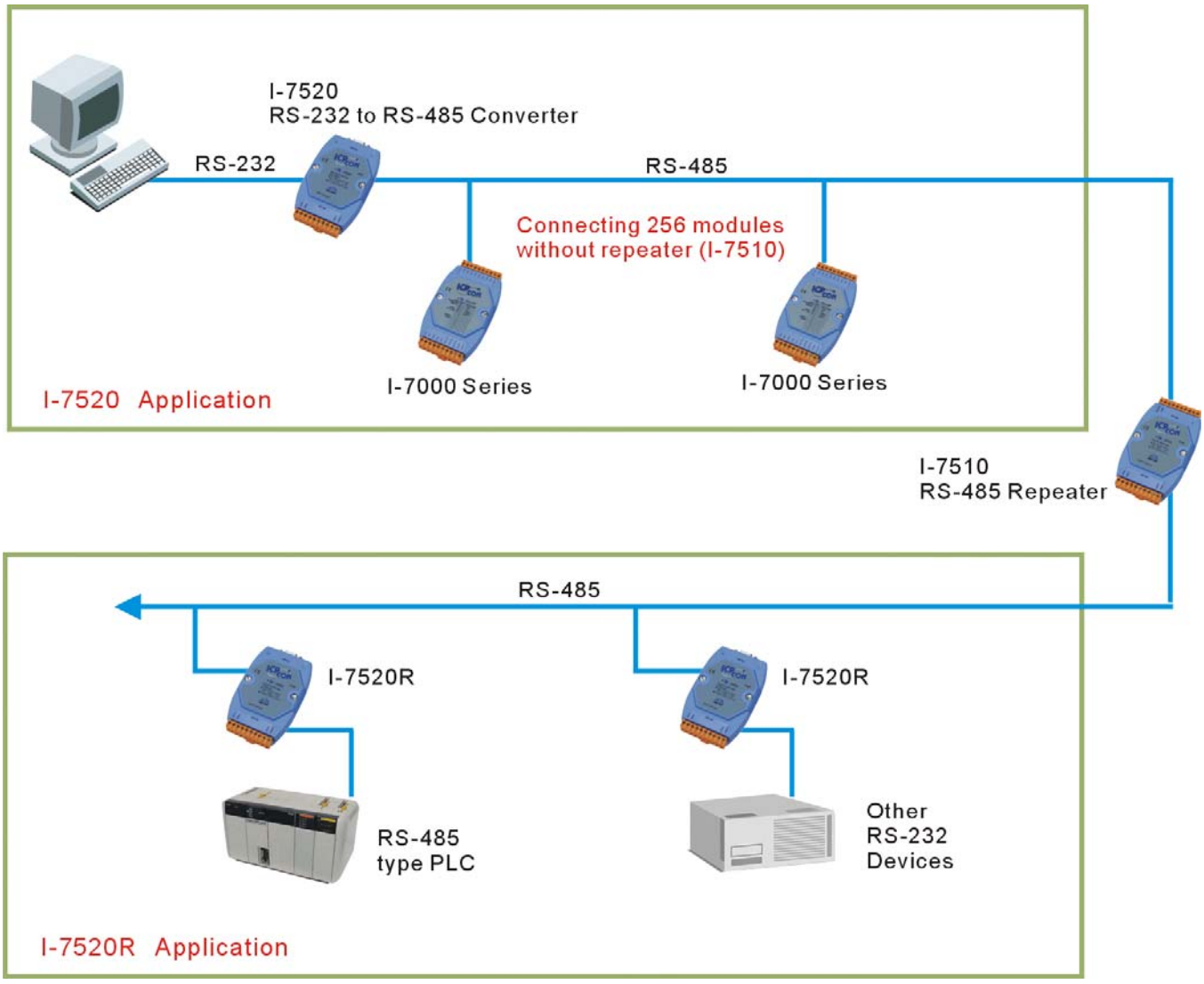


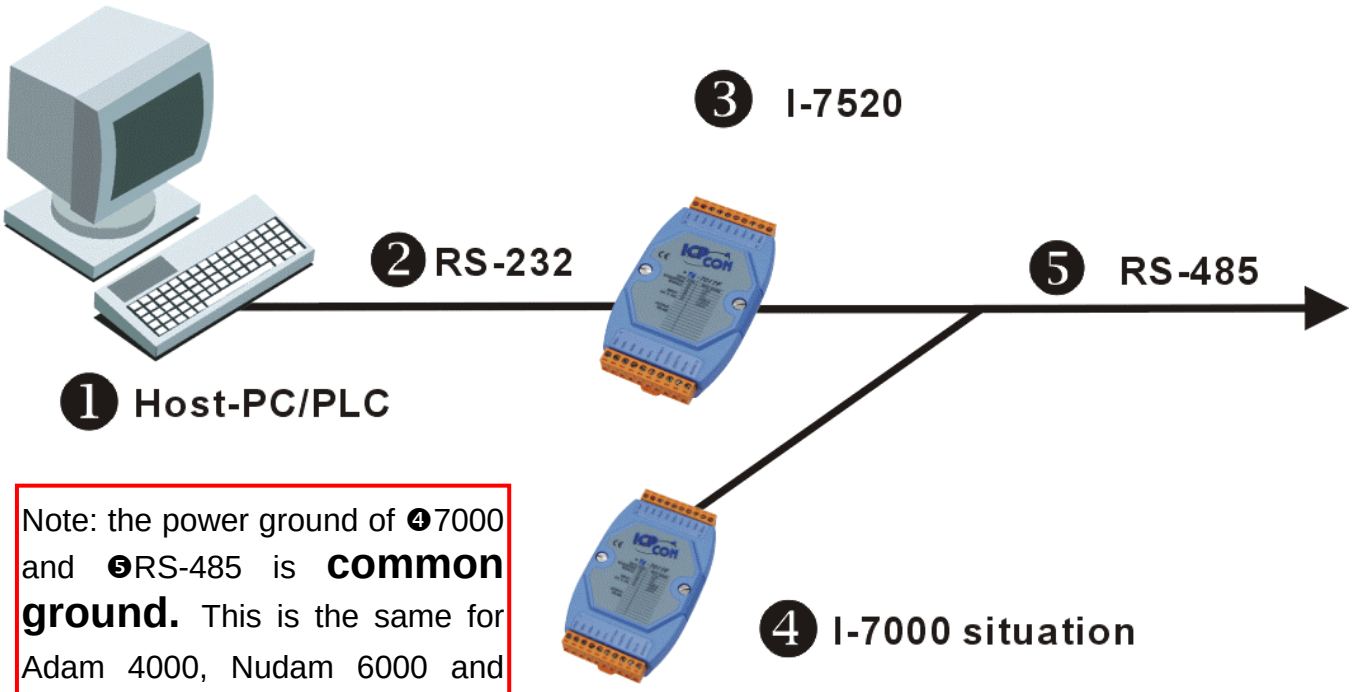


2.8 How to select 7520 / 7520R

The 7520R is exactly the same as 7520 except for the isolation site. The isolation site of the 7520 is located in the RS-232 interface circuit, but the isolation site of the 7520R is located in the RS-485 interface circuit. That is to say, the power input and RS-485 interface is common ground for the 7520 but the power input and RS-232 interface is only common ground for the 7520R as follows:

	7520	7520R
RS-485 site	Common ground	Isolation site
Power ground		Common ground
RS-232 site	Isolation site	
Applications	Most applications.	For RS-232 type PLC networking





Note: the power ground of ❹7000 and ❺RS-485 is **common ground.** This is the same for Adam 4000, Nudam 6000 and DATAFORTH 9B series modules.

In most applications, the ❸7520 are used to convert the ❷RS-232 signal to ❺RS-485 network. Normally the ❸7520 does not use the same DC power ground as the ❶Host PC/PLC, and the isolation site is in the RS-232 section. Therefore the ❶Host PC/PLC is isolated from ❺RS-485 network. That is to say, if there is any high voltage transient on ❺RS-485 network, the ❶Host PC/PLC will be free from damage.

WARNING!! ERROR CONDITION 1: if the ❸7520 are replaced by ❸7520R and the ❸7520R uses the same DC power ground with ❹7000. In this situation,

(1) The ❶Host PC/PLC is common ground with ❷RS-232
(2) The ❷RS-232 is common ground with power ground of ❸7520R
(3) The power ground of ❸7520R is common ground with power ground of ❹7000
(4) The power ground of ❹7000 is common ground with ❺RS-485

Therefore the ❶Host PC/PLC is common ground with ❺RS-485 network. That is to say, there is no isolation between ❶Host PC/PLC and ❺RS-485 network. The ❶Host PC/PLC may be damaged if there is high voltage transient on ❺RS-485 network.

WARNING!! ERROR CONDITION 2: if the ❸7520 uses the same DC power ground with ❶Host PC/PLC (for example, ❶Host PC/PLC provide non-isolated DC power source to ❸7520). In this situation,

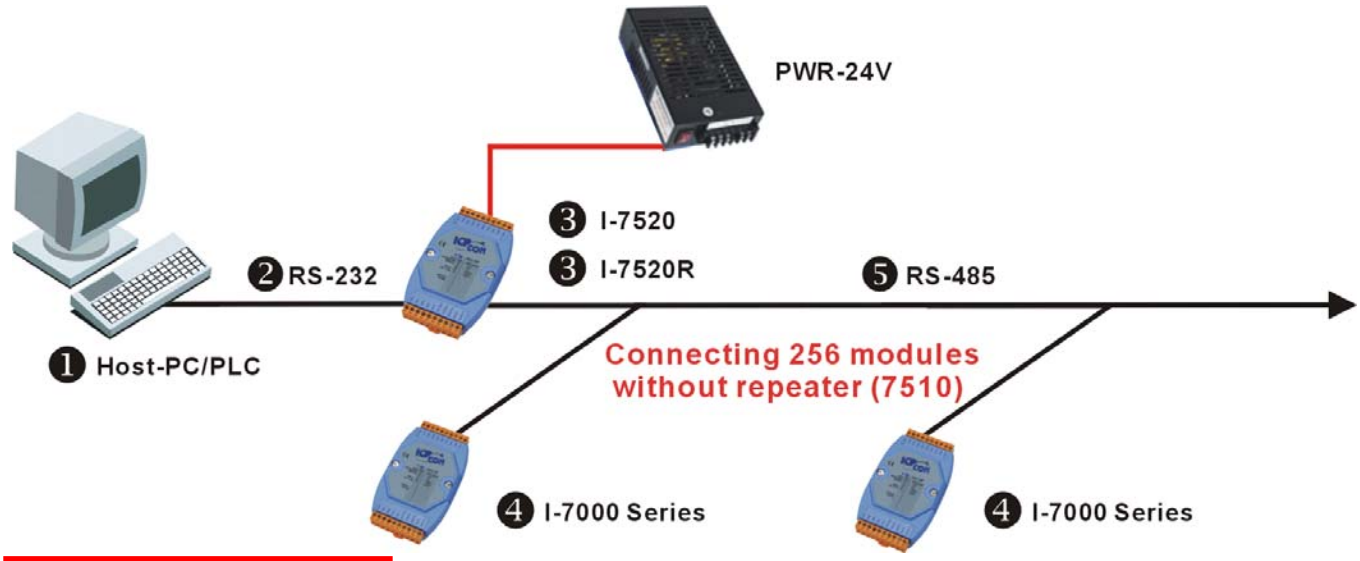
(1) The ❶Host PC/PLC is common ground with power ground of ❸7520

(2) The power ground of ❸7520 is common ground with ❺RS-485

Therefore the ❶Host PC/PLC is common ground with ❺RS-485 network. That is to say, there is no isolation between ❶Host PC/PLC and ❺RS-485 network. So the ❶Host PC/PLC may be damaged if there is high voltage transient on ❺RS-485 network.

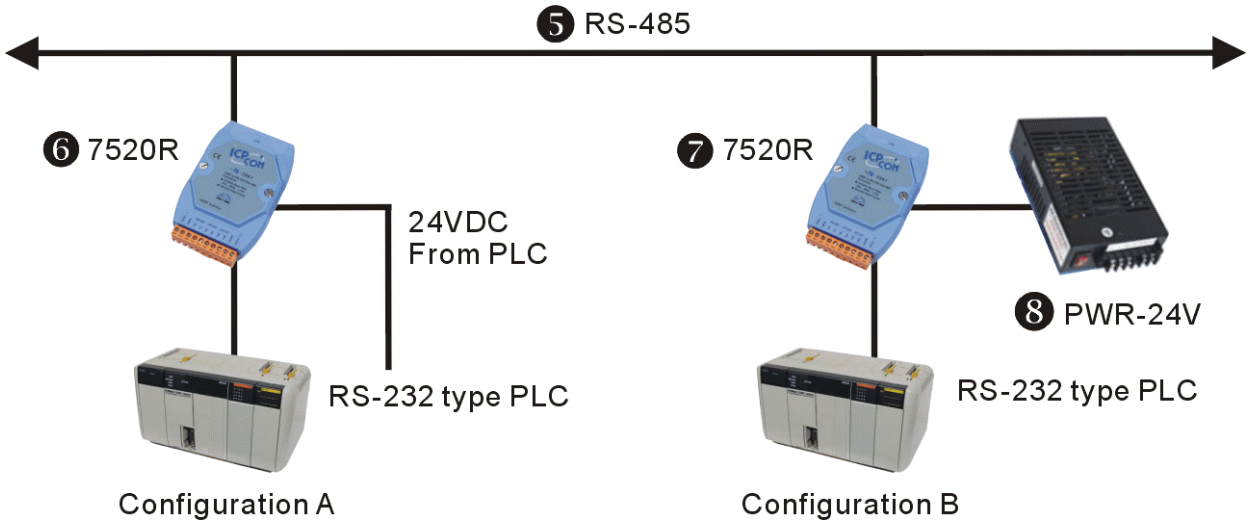
OK CONDITION: If the DC power ground of ❸7520 or ❸7520R is not common to any module, the ❶Host PC/PLC will be isolated from ❺RS-485 network in all conditions.

The power adapter PWR-24 is designed for single 7000 series modules only. The 24V DC output of the PWR-24 is isolated from its AC input. If the ❸7520 or ❸7520R is connected to the PWR-24, this PWR-24 cannot connect to the other module. Normally the ❶Host PC/PLC uses a switching power and the DC output of this power supply is also isolated from its AC input. Therefore the DC power ground of ❸7520 or ❸7520R is isolated from ❶Host PC/PLC. Therefore, the ❶Host PC/PLC is isolated from ❺RS-485 network in all condition.



❶Host PC/PLC is isolated from ❺RS-485 network for ❸7520 or ❸7520R in all condition

The 7520R is designed for PLC networking. During normal conditions, the PLC system will have a stable DC-24V power source. The user may use this power source to ❻7520R(configuration A). When using ❼7520, the user must use another power source, ❽PWR-24 (configuration B).



The isolation feature is very important in real world applications, therefore the user should pay attention when selecting the correct module. If the wrong module is selected, the isolation will be removed but the module will still function OK. This may cause unexpected damaged by high-energy transients on an RS-485 network.

3. USB series: I-7560 / I-7561 / I-7563

What is USB?

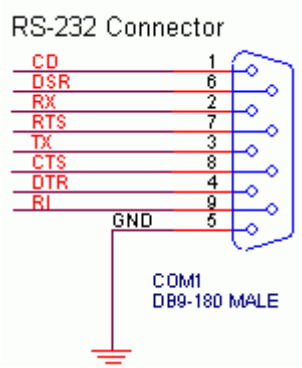
USB, or Universal Serial Bus is a connectivity specification developed by computer and telecommunication industry members for attaching peripherals to computers.
USB is designed to free all the troubles when installing external peripherals. It eliminates the hassle to open computer case for installing cards needed for certain devices.
It is designed to meet Microsoft Plug and Play (PnP) specification, meaning users can install, and hot-swap devices without long installation procedures and reboots.

The I-756x USB to RS-232 or RS-485 or RS-422 converter are your smart and convenient accessory for connecting RS-232 serial devices to your USB-equipped Windows host computer. It provides a bridge connection with a standard DB 9-pin male serial port connector in one end and a standard Type-A USB plug connector on the other end. You simply attach the serial device onto the serial port of the cable and plug the USB connector into your PC USB port. It allows a simple and easy way of adding serial connections to your PC without having to go thru inserting a serial card and traditional port configuration.

This USB to Serial adapter is ideal for connecting modems, cellular phones, PDAs, digital cameras, card readers and other serial devices to your computer. It provides serial connections up to 1Mbps of data transfer rate. And since USB does not require any IRQ resource, more devices can be attached to the system without the previous hassles of device and resource conflicts.

Finally, the I-756x USB to Serial adapter is a fully USB Specification compliant device and therefore supports advanced power management such as suspend and resume operations as well as remote wakeup. The I-756x USB Serial products are designed to work on Win98/ME/2000/XP and Linux operating systems.

3.1 I-7560 Pin Assignment and Specifications:



Introduction

The **I-7560** adds a Windows serial Com port via its USB connection and is compatible with new & legacy RS-232 devices. USB Plug and Play allows easy serial port expansion and requires no IRQ, DMA, or I/O port resources.

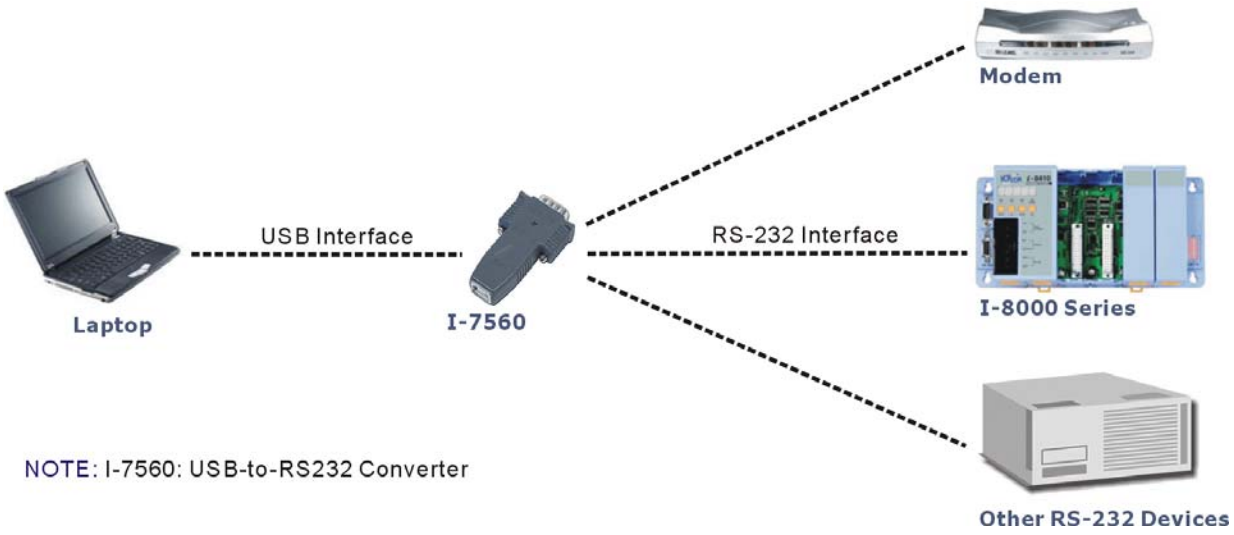
I-7560 features a full set of RS-232 modem data and control signals (TxD, RxD, RTS, CTS, DSR, DTR, DCD, RI, and GND) on its PC compatible DB9 male connector. It also features a high-speed 115.2 Kb/s transmission rate. So you can download program to I-8000 series, and supports various O.S. No external power supply is required as **I-7560** takes its power from the USB bus.

I-7560 comes complete with drivers for Microsoft Windows '98, Windows ME, Windows 2000 and Windows XP. Drivers are also available for Linux.

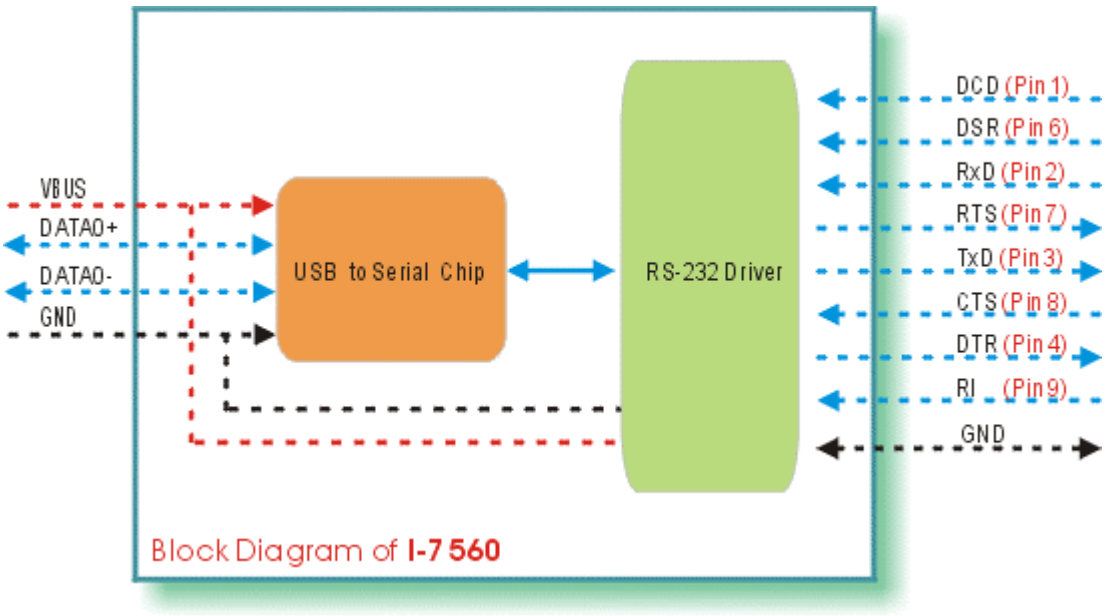
Specifications

- Compatibility: USB 1.1 standard.
- Input port: USB
- Output port: 9-wire RS-232
- Cable: USB type A connector (Type A to Type B cable provided).
- RS-232 Signals: TxD, RxD, RTS, CTS, DSR, DTR, DCD, RI, and GND
- Power consumption: 1.5 W max.
- Operating temperature: -25℃ to +75℃
- Storage temperature: -25℃ to +80℃
- Humidity: 5~ 95%
- Driver Supported: Windows 98/ME/2000/XP, Linux

3.1.1 The I-7560 System Network Configuration:



3.1.2 Block Diagram:



3.1.3 I-7560 Driver Installation

Installing the Device

This section will guide you on how to install the I-7560 USB to RS-232 converter under Windows XP, Windows 2000, Windows ME, and Windows 98 operating systems. (No support for WinNT). Download driver files from

1. Package CD, \Napdos\7000\756x\7560
2. ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/7000/756x/7560

The following steps will show how to install the device under Windows 2000. Basically, the procedures are also somewhat the same for other Windows operating systems.

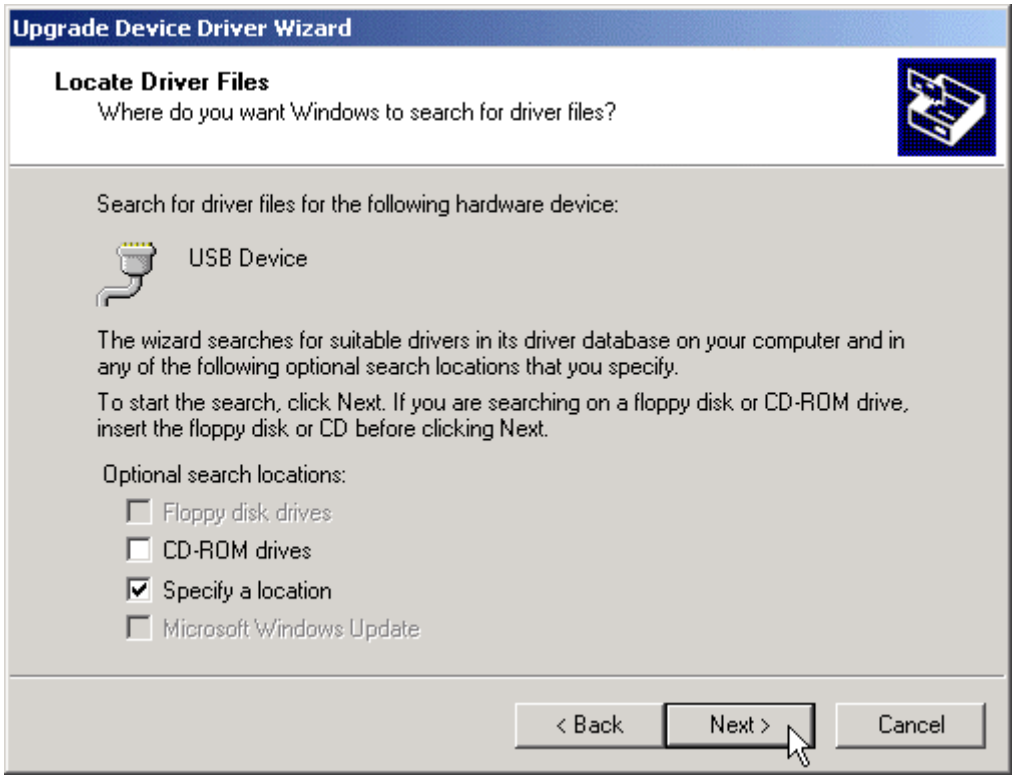
1. Power on your computer and boot to Windows.
2. Locate the USB port of your computer and plug in the I-7560.
3. Windows will detect the new device and will initiate the Found New Hardware Wizard prompting you to install the software for the detected USB Device. Select to install from a list or specific location. Click Next to continue.

Upgrade Device Driver Wizard
Welcome to the Upgrade Device Driver Wizard
This wizard helps you upgrade a device driver for a hardware device.
To continue, click Next.
< Back
Next >
Cancel

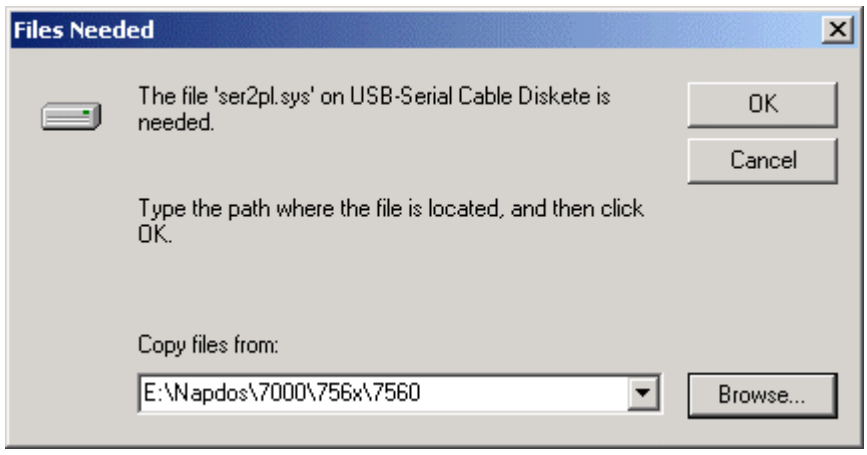
4. An “Install Hardware Device Drivers” window is shown. Click “Next” to initiate a search for a suitable driver for your device.

Upgrade Device Driver Wizard
Install Hardware Device Drivers
A device driver is a software program that enables a hardware device to work with an operating system.
This wizard upgrades drivers for the following hardware device:
USB Device
Upgrading to a newer version of a device driver may add functionality to or improve the performance of this device.
What do you want the wizard to do?
Search for a suitable driver for my device (recommended)
Display a list of the known drivers for this device so that I can choose a specific driver
< Back
Next >
Cancel

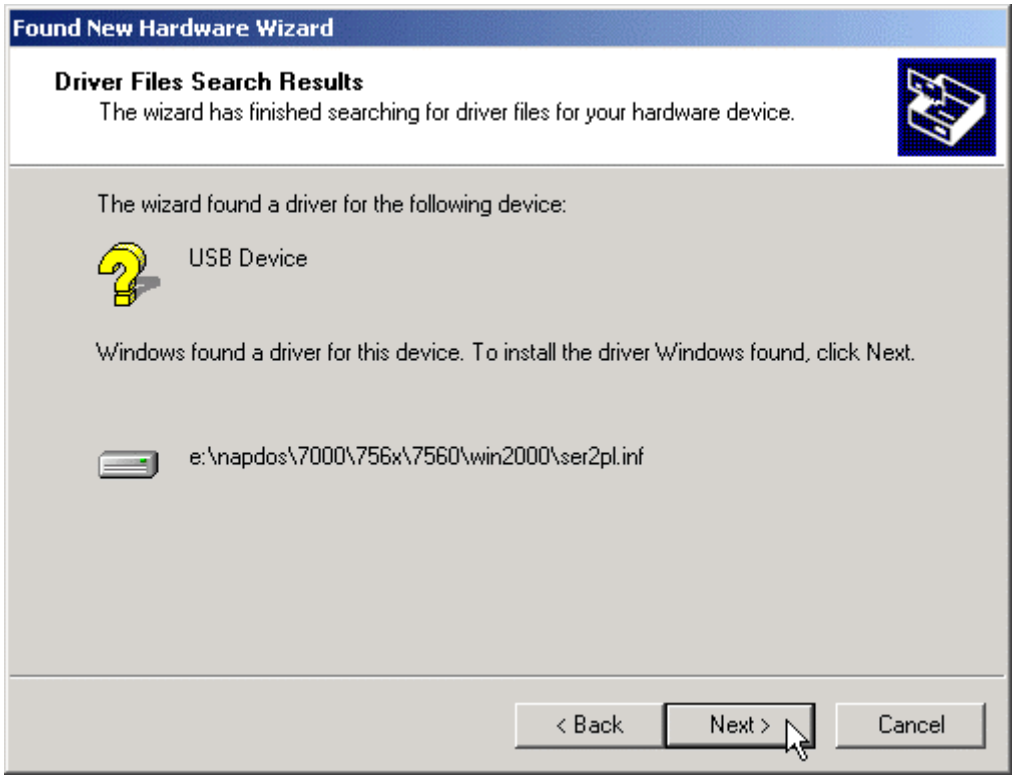
5. Select the “Specify a location” optional search locations. If the “CD-ROM drives” checkbox is selected, please insert the driver CD. Click “Next” to start the search.


Upgrade Device Driver Wizard
Locate Driver Files
Where do you want Windows to search for driver files?
Search for driver files for the following hardware device:
USB Device
The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.
To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.
Optional search locations:
Floppy disk drives
CD-ROM drives
Specify a location
Microsoft Windows Update
< Back
Next >
Cancel

6. If the “Specify a location” is selected, you much choose the correct path. Enter E:\Napdos\7000\756x\7560(The ‘E’ is the Disk that Package CD put in). Click “OK” to start the search.



7. Once Windows finds the correct driver, click “Next” to install the driver.


Found New Hardware Wizard
Driver Files Search Results
The wizard has finished searching for driver files for your hardware device.
The wizard found a driver for the following device:
USB Device
Windows found a driver for this device. To install the driver Windows found, click Next.
e:\napdos\7000\756x\7560\win2000\ser2pl.inf
< Back
Next >
Cancel

8. Windows will then install the driver for the USB-to-Serial COM Port. Once installation is complete, Windows will notify you that it has finished installing the software. Click “Finish” to continue.

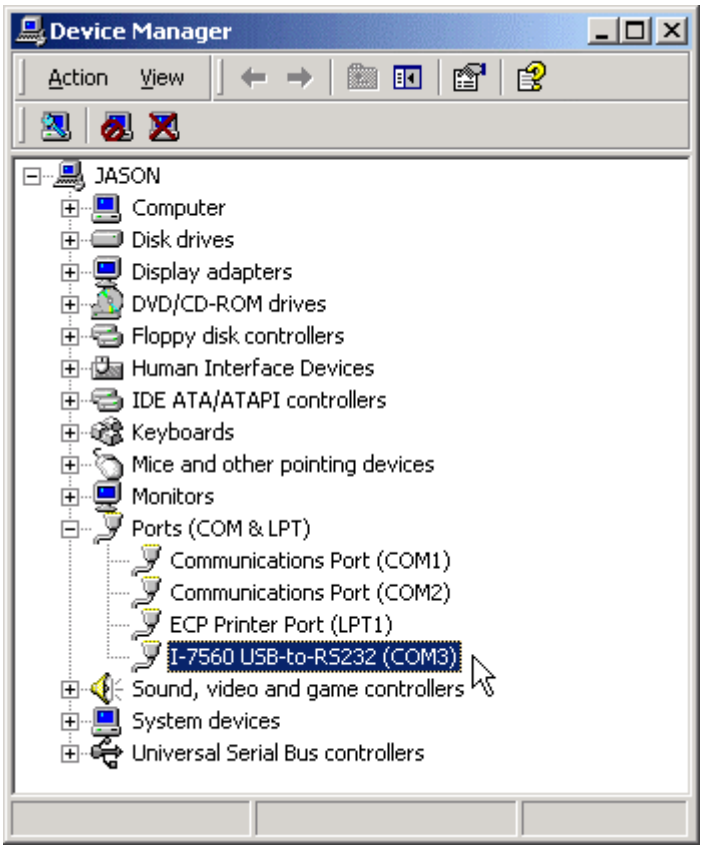
3.1.4 Verifying the Installation:

This section will show you on how to verify whether the I-7560 was properly installed. You will also need to determine the COM port assignment made by Windows for the USB to RS-232 converter.

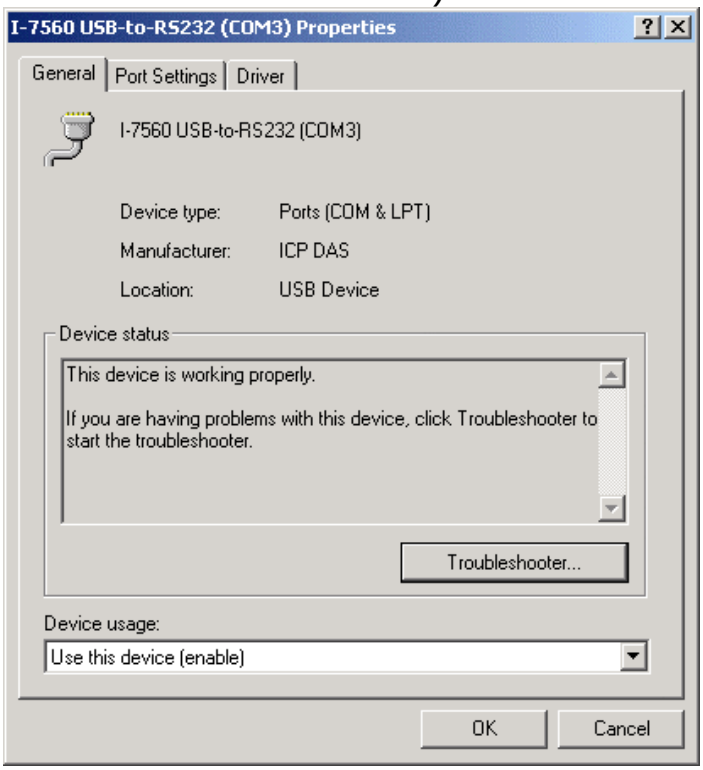
Note: Before you connect the I-7560 for the first time, ensure that you do not attach any serial devices to the converter. You must only connect the I-7560 itself.

To verify whether the device is properly installed and determine the COM port assignment for the device:

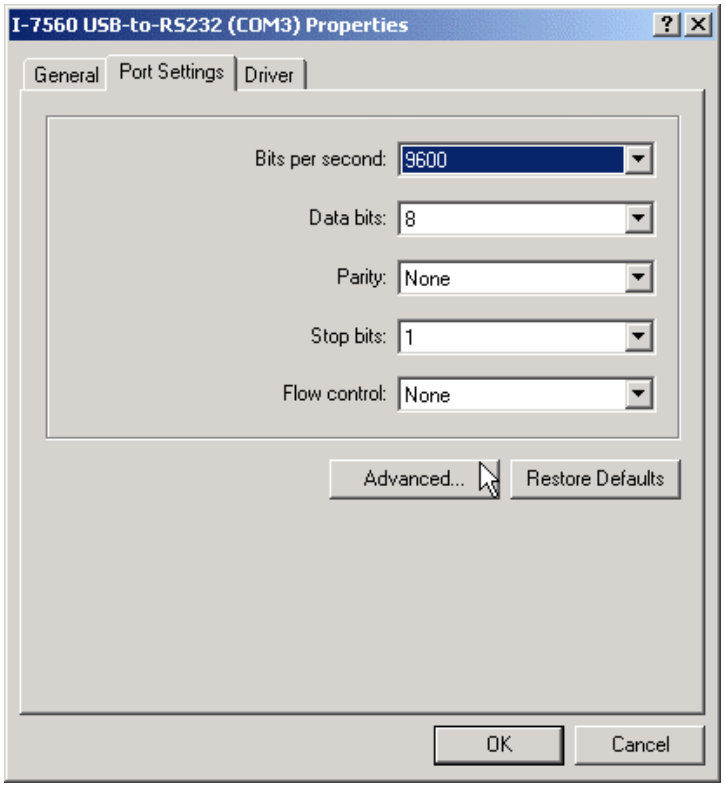
1. Click "Start" → "Settings" → "Control Panel", then double click on the "System" icon. Once the System Properties window is display, click on " Hardware" tab and then click on the "Device Manager" button. Double-click on Ports (COM & LPT). If the device was correctly installed, you should now see the I-7560 USB-to-RS232 (COM3) device listing. This also means that Windows has assigned the device to the COM3 port.



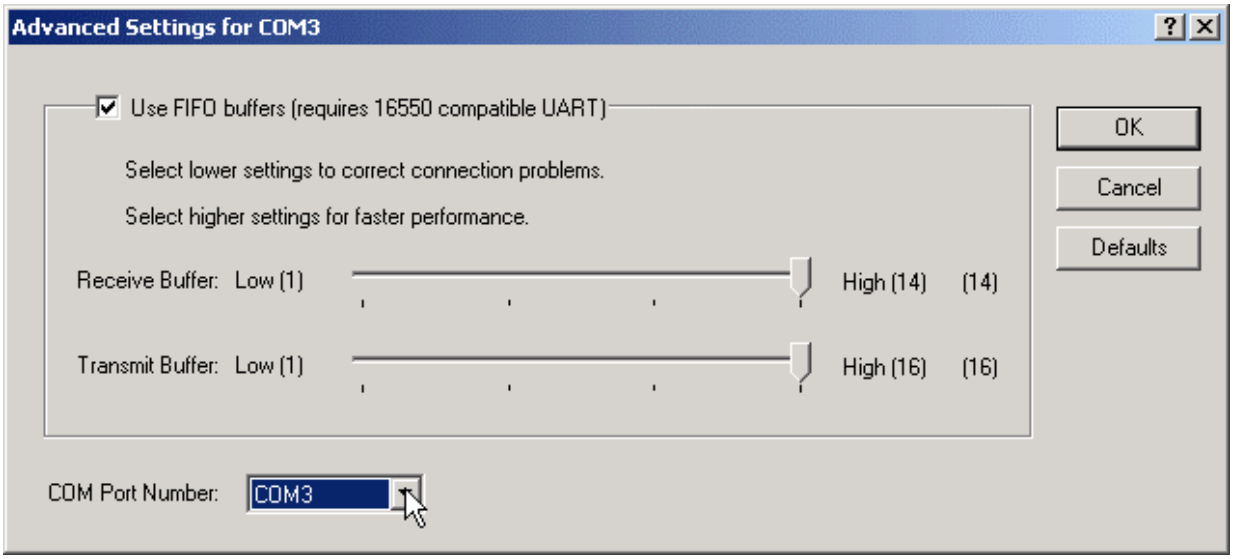
2. If you need to reassign the COM Port name to another Port number, you can double-click on the device (I-7560 USB-to-RS232) to view the properties. (The I-7561 cannot reassign the COM Port name to another Port number under Win98 and Win98SE.)



3. Once the properties window opens click on the Port Settings tab. Then click on the advanced button.



4. The Advanced Settings dialog box will now be displayed. Click on the COM Port Number drop down box to check what other port numbers are available. If, for instance, Windows has assigned COM5 to the device, you may try to reassign it to a lower unused port number. Click OK when finished. Try running HyperTerminal to test whether the new port number is OK.



Note: Some software programs may only support Ports up to COM4 and may not work if the port is assigned to COM5 or higher.

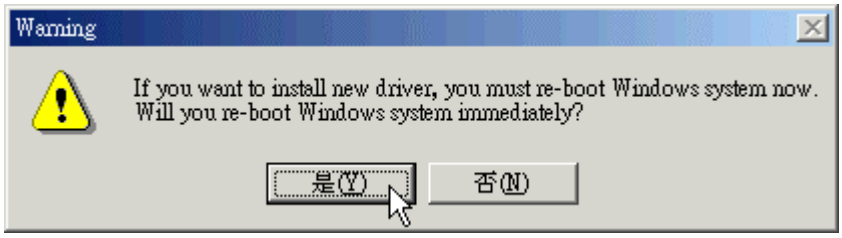
5. Once you have verified that the device has been properly installed, you may now proceed to use the USB-to-RS232 Converter to connect to serial devices. Attach the serial device to the serial port of the adapter and then connect the USB connector to the USB port of your computer. Use the supplied driver for the serial device if needed.

3.1.5 Uninstalling the Device Driver

It is easy to uninstall the USB to Serial device driver:

1. Run the DRemover98_2K.exe Uninstall program which can be found on the Package CD, \Napdos\7000\756x\7560 or at ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/7000/756x/7560
2. The uninstall program will then prompt you whether you want to remove the utility program. Click " OK " to continue.

3. After the uninstall is complete, the program will prompt you to restart Windows. Click " Yes " to continue.


Warning
If you want to install new driver, you must re-boot Windows system now.
Will you re-boot Windows system immediately?
是(Y)
否(N)

4. Windows will show a dialog box to notify you that the driver was removed successfully. Wait for Windows to restart your computer.

3.2 I-7561 Pin Assignment and Specifications

Introduction

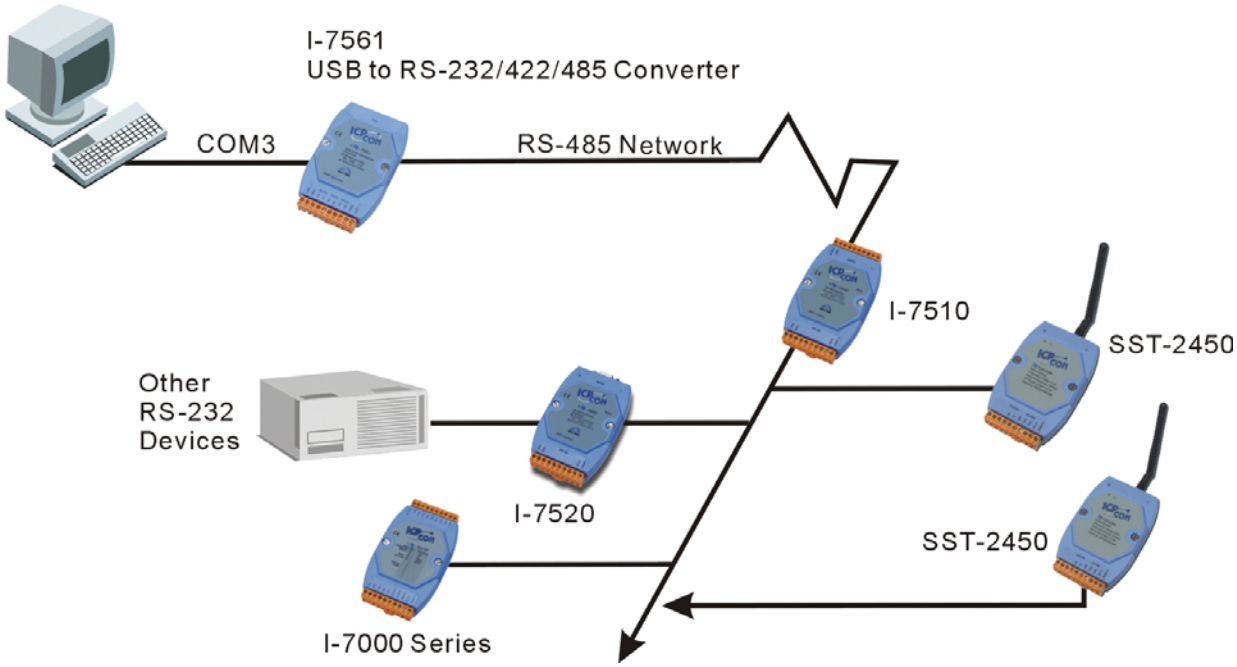
The I-7561 is a cost-effective module for transfer serial data over USB. It allows you to connect your serial devices to systems using a USB interface. Connecting the **I-7561** to a PC, you get one extra high-speed RS-232/422/485 ports. Like our I-7520A, the I-7561 contains " Self Tuner " This chip auto-tunes the baud rate and data format to the RS-485 network. The I-7561 module derives the power from the USB port and doesn't need any power adapter (when you use I-7561, you should connect power ground to other modules). It also features a high-speed 115.2 Kb/s transmission rate, and supports various O.S. independent RS-232/422/485 Ports.

Specifications

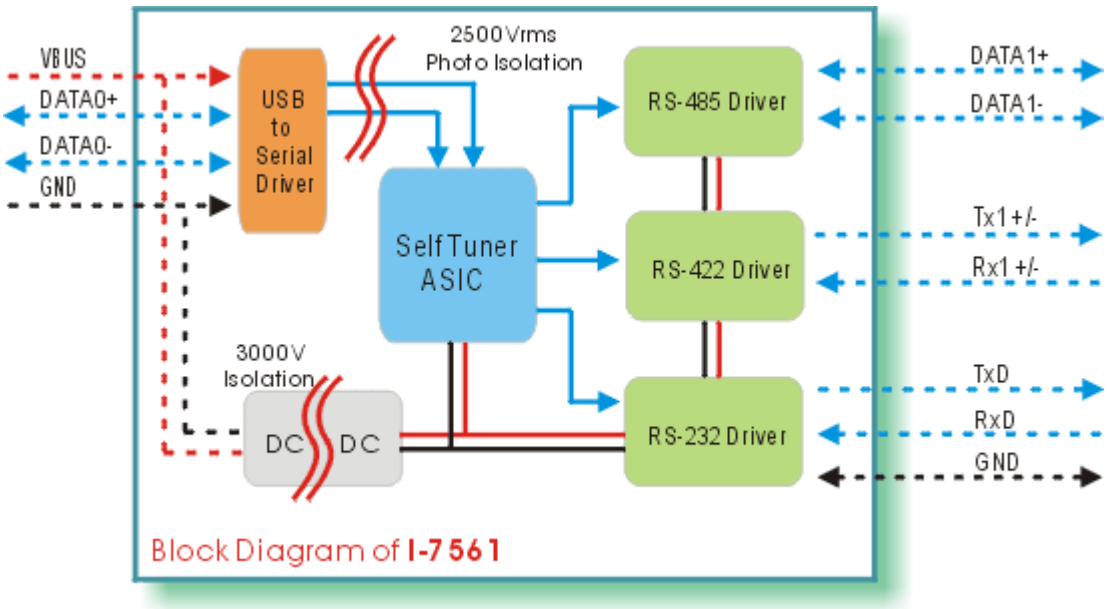
- Full compatibility with USB 1.1 specifications.
- Input Port: USB.
- Cable: USB type "A" connector (Type "A" to type "B" cable provided).
- Output Port: 3-wire RS-232, RS-422, RS-485
- Speed: "Self Tuner" inside
- 3000 V DC Isolation protections provided.
- Photo-coupler isolation: 2500V rms
- 256 modules max. In one RS-485 network without repeater.
- Repeater request: 4,000 feet or over 256 modules.
- Parity Bit : odd, even, none
- Data Bit : 5,6,7,8
- Stop Bit :1, 1.5, 2
- Power requirements: Voltage support by USB interface of the Host-PC
- Operating temperature: -25℃ to +75℃
- Storage temperature: -25℃ to +80℃
- Humidity: 5~ 95%
- Driver Supported: Windows 98/ME/2000/XP, Linux

3.2.1 The I-7561 System Network Configuration:

- Multiple Baud Rate
- Multiple Data Format



3.2.2 The I-7561 Block Diagram:

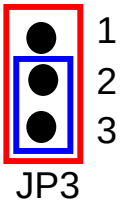


3.2.3 I-7561 has four different output types.

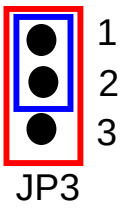
Selecting the I-7561 output type.
NOTE: The RS-232, RS-422 and RS-485 output types couldn't be used simultaneously, which means that you can only select 1 type to output.

Type 1: 1-channel RS-485 output.
Type 2: 1-channel RS-422 output.
Type 3: 2-channel RS-485 output. (Support star network)
Type 4: 1-channel RS-232 output.

RS422/485 Output Jumpers settings:
For type 1: Set the JP3 jumper to positions 2 and 3.
For type 2: Set the JP3 jumper to positions 2 and 3.
For type 3: Set the JP3 jumper to positions 1 and 2.

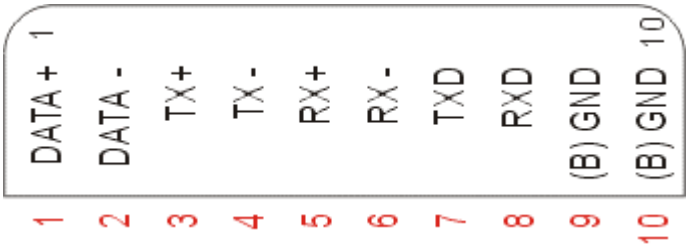


Types 1 and 2:
Default setting
RS-422 or RS-485



Type 3:
2-channel RS-485

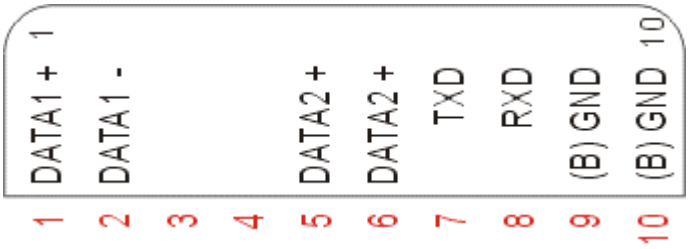
Pin Assignment For type1 and type2:



RS-485 Pin define:
DATA+ and DATA-

RS-422 Pin define:
TX+, TX-, RX+ and RX-

Pin Assignment For type3:



Channel one Pin define:
DATA1+ and DATA1-

Channel two Pin define:
DATA2+ and DATA2-

3.2.4 I-7561 Driver Installation

Installing the Device

This section will guide you on how to install the I-7561 USB to RS-232/422/485 converter under Windows XP, Windows 2000, Windows ME, and Windows 98 operating systems. (No support for WinNT).
Download driver files from

1. Package CD, \Napdos\7000\756x\7561
2. ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/7000/756x/7561

The following steps will show how to install the device under Windows 2000. Basically, the procedures are also somewhat the same for other Windows operating systems.

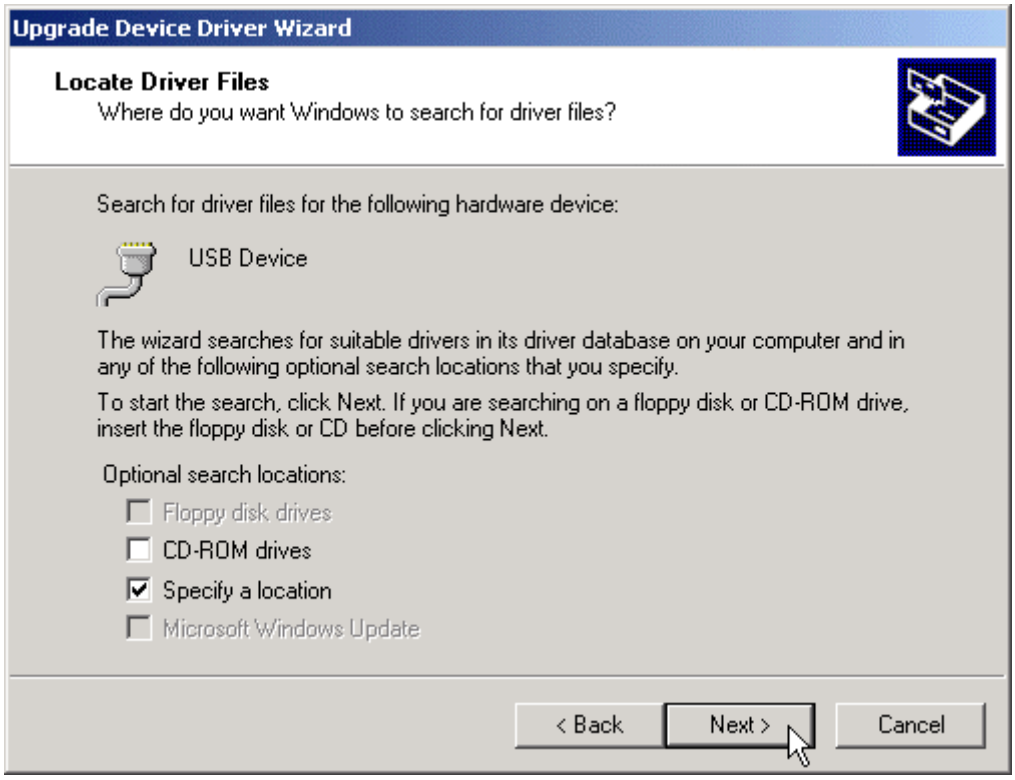
1. Power on your computer and boot to Windows.
2. Locate the USB port of your computer and plug in the I-7561.
3. Windows will detect the new device and will initiate the Found New Hardware Wizard prompting you to install the software for the detected USB Device. Select to install from a list or specific location. Click Next to continue.

Upgrade Device Driver Wizard
Welcome to the Upgrade Device Driver Wizard
This wizard helps you upgrade a device driver for a hardware device.
To continue, click Next.
< Back
Next >
Cancel

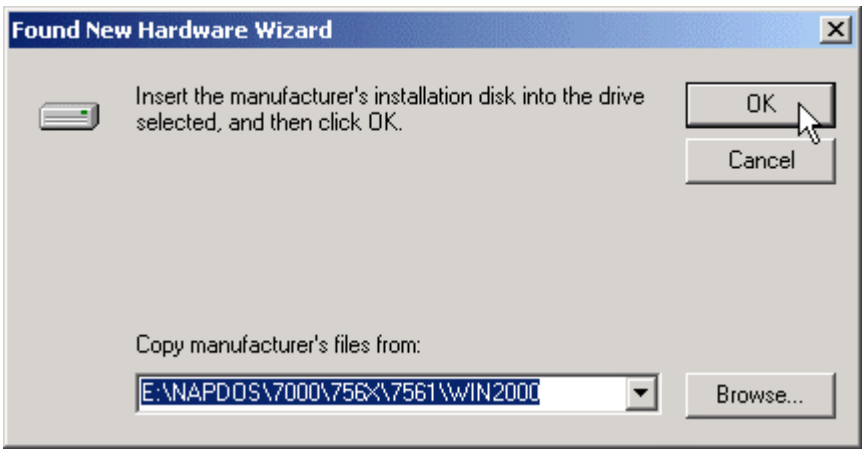
4. An “Install Hardware Device Drivers” window is shown. Click “Next” to initiate a search for a suitable driver for your device.

Upgrade Device Driver Wizard
Install Hardware Device Drivers
A device driver is a software program that enables a hardware device to work with an operating system.
This wizard upgrades drivers for the following hardware device:
USB Device
Upgrading to a newer version of a device driver may add functionality to or improve the performance of this device.
What do you want the wizard to do?
Search for a suitable driver for my device (recommended)
Display a list of the known drivers for this device so that I can choose a specific driver
< Back
Next >
Cancel

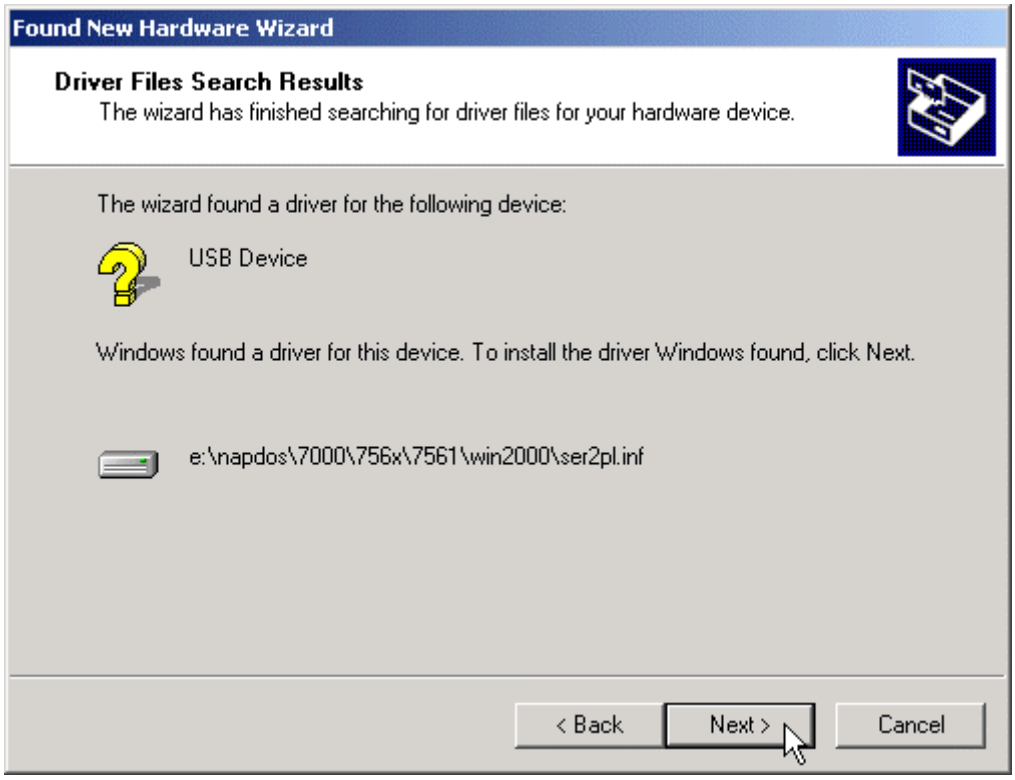
5. Select the “Specify a location” optional search locations. If the “CD-ROM drives” checkbox is selected, please insert the driver CD. Click “Next” to start the search.


Upgrade Device Driver Wizard
Locate Driver Files
Where do you want Windows to search for driver files?
Search for driver files for the following hardware device:
USB Device
The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.
To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.
Optional search locations:
Floppy disk drives
CD-ROM drives
Specify a location
Microsoft Windows Update
< Back
Next >
Cancel

6. If the “Specify a location” is selected, you much choose the correct path. Enter E:\Napdos\7000\756x\7561(The ‘E’ is the Disk that Package CD put in). Click “OK” to start the search.



7. Once Windows finds the correct driver, click “Next” to install the driver.


Found New Hardware Wizard
Driver Files Search Results
The wizard has finished searching for driver files for your hardware device.
The wizard found a driver for the following device:
USB Device
Windows found a driver for this device. To install the driver Windows found, click Next.
e:\napdos\7000\756x\7561\win2000\ser2pl.inf
< Back
Next >
Cancel

8. Windows will then install the driver for the USB-to-RS232/422/485. Once installation is complete, Windows will notify you that it has finished installing the software. Click “Finish” to continue.

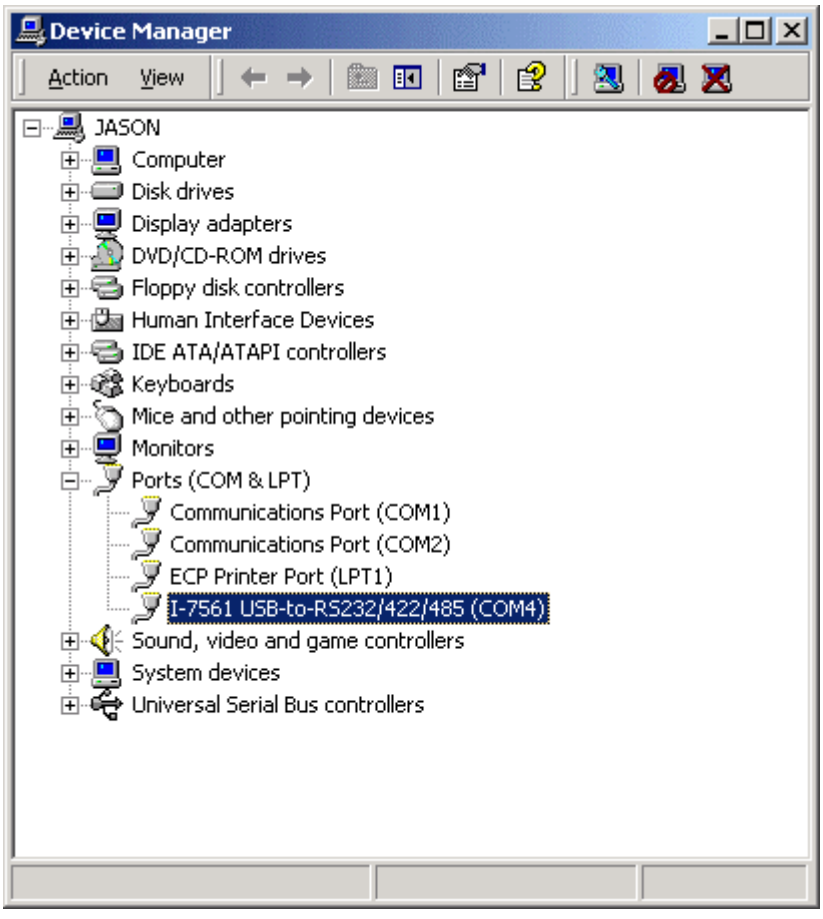
3.2.5 Verifying the Installation:

This section will show you on how to verify whether the I-7561 was properly installed. You will also need to determine the COM port assignment made by Windows for the USB to RS-232/422/485 converter.

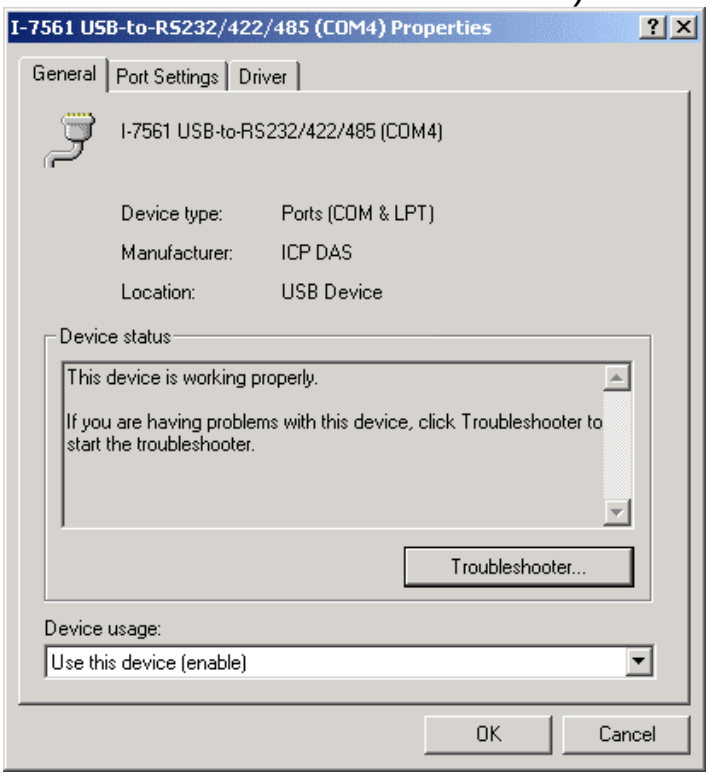
Note: Before you connect the I-7561 for the first time, ensure that you do not attach any serial devices to the converter. You must only connect the I-7561 itself.

To verify whether the device is properly installed and determine the COM port assignment for the device:

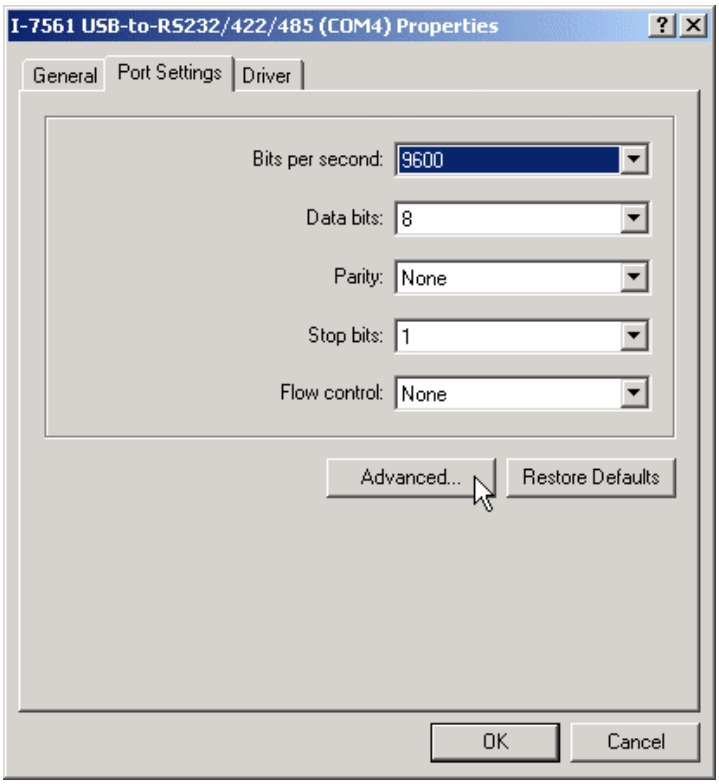
1. Click "Start" → "Settings" → "Control Panel", then double click on the "System" icon. Once the System Properties window is display, click on "Hardware" tab and then click on the "Device Manager" button. Double-click on Ports (COM & LPT). If the device was correctly installed, you should now see the I-7561 USB-to-RS232/422/485 (COM4) device listing. This also means that Windows has assigned the device to the COM4 port.



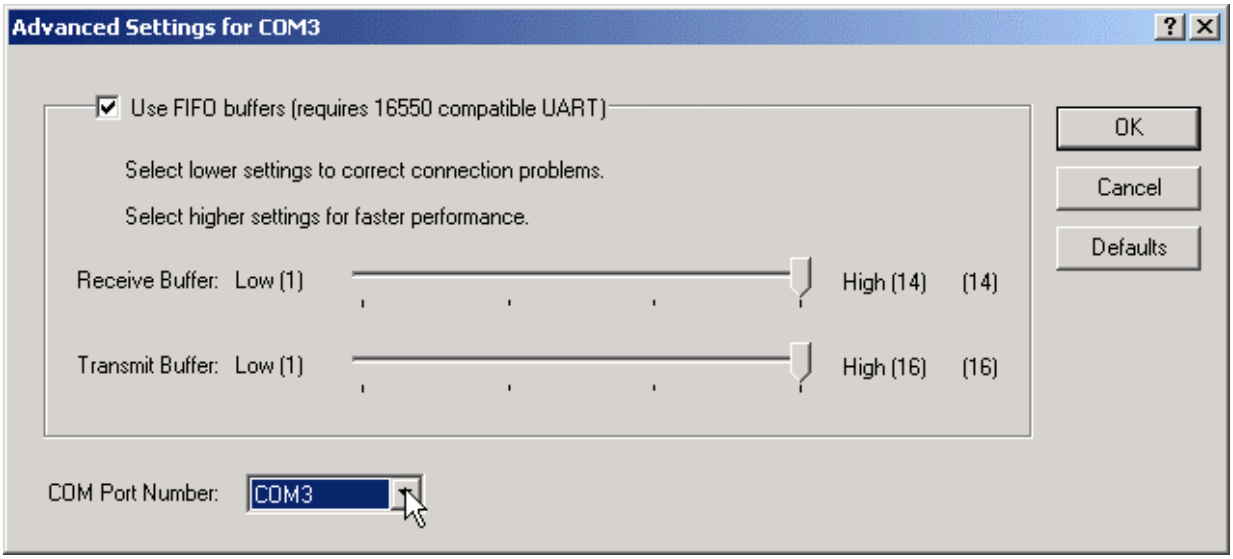
2. If you need to reassign the COM Port name to another Port number, you can double-click on the device (I-7561 USB-to-RS232/422/485) to view the properties. (The I-7561 cannot reassign the COM Port name to another Port number under Win98 and Win98SE.)



3. Once the properties window opens click on the Port Settings tab. Then click on the advanced button.



4. The Advanced Settings dialog box will now be displayed. Click on the COM Port Number drop down box to check what other port numbers are available. If, for instance, Windows has assigned COM5 to the device, you may try to reassign it to a lower unused port number. Click OK when finished. Try running HyperTerminal to test whether the new port number is OK.



Note: Some software programs may only support Ports up to COM4 and may not work if the port is assigned to COM5 or higher.

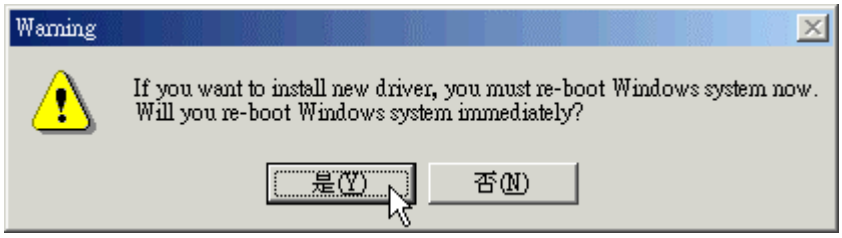
5. Once you have verified that the device has been properly installed, you may now proceed to use the USB-to-RS232/422/485 Converter to connect to serial devices. Attach the serial device to the serial port of the adapter and then connect the USB connector to the USB port of your computer. Use the supplied driver for the serial device if needed.

3.2.6 Uninstalling the Device Driver

It is easy to uninstall the USB to Serial device driver:

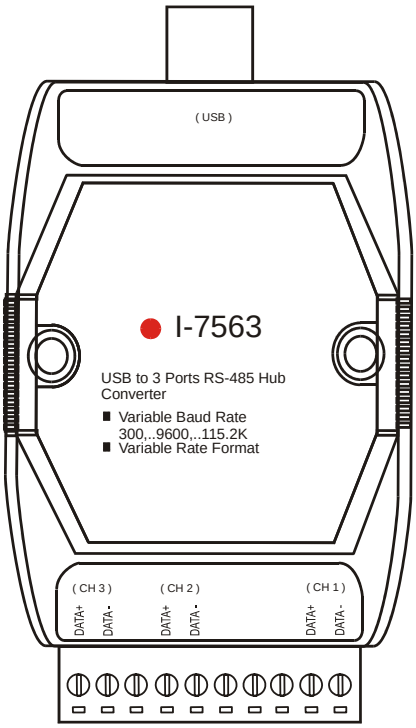
1. Run the DRemover98_2K.exe Uninstall program which can be found on the Package CD, \Napdos\7000\756x\7561 or at ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/7000/756x/7561
2. The uninstall program will then prompt you whether you want to remove the utility program. Click OK to continue.

3. After the uninstall is complete, the program will prompt you to restart Windows. Click “Yes” to continue.


Warning
If you want to install new driver, you must re-boot Windows system now.
Will you re-boot Windows system immediately?
是(Y)
否(N)

4. Windows will show a dialog box to notify you that the driver was removed successfully. Wait for Windows to restart your computer.

3.3 I-7563 Pin Assignment and Specifications:



Introduction

The **I-7563** is a cost-effective module for transfer serial data over USB. It allows you to connect your serial devices to systems using a USB interface. Connecting the **I-7563** to a PC, The **I-7563** contains " Self Tuner " This chip auto-tunes the baud rate and data format to the Rs-485 network. The **I-7563** module derives the power from the USB port and doesn't need any power adapter. It also features a high-speed 115.2 Kb/s transmission rate, and supports various O.S.

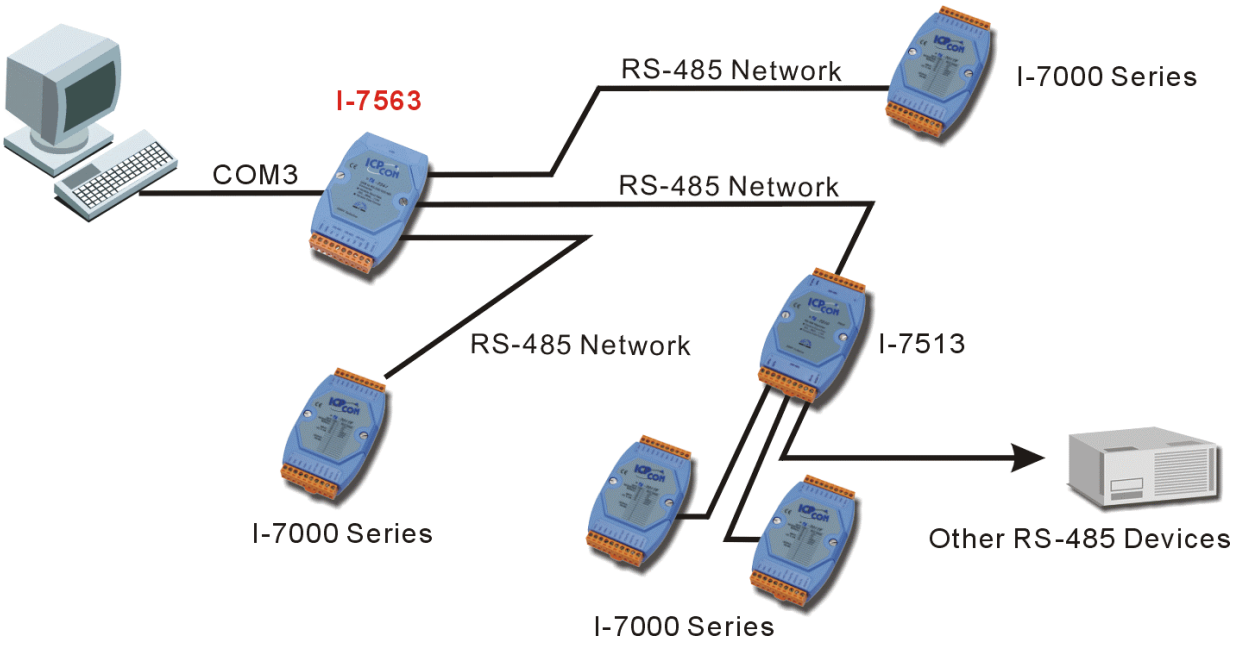
Do you have any RS-485 wiring problems? The **I-7563** is USB to three ports RS-485 Hub. Each channel has its own RS-485 driver IC on it, so it can support star-shaped wiring.

Specifications

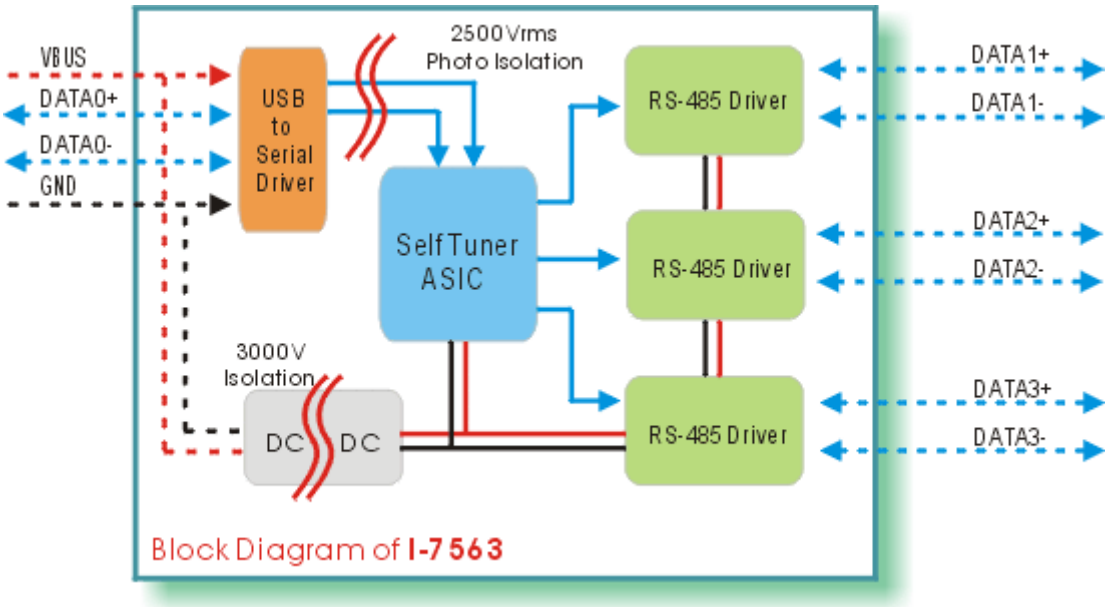
- Full compatibility with USB 1.1 specifications.
- Input Port: USB.
- Output Port: Three RS-485.
- Speed: "Self Tuner" inside
- 3000 V DC Isolation protections provided.
- Photo-coupler isolation: 2500V rms
- 256 modules max. In three channels RS-485 network without repeater.
- 2048 modules max. In three channels RS-485 network with repeater.
- Repeater request: 4,000 feet or over 256 modules.
- Parity Bit : odd, even, none
- Data Bit : 5,6,7,8
- Stop Bit :1, 1.5, 2
- Operating temperature: -25℃ to +75℃
- Storage temperature: -25℃ to +80℃
- Humidity: 5~ 95%
- Driver Supported: Windows 98/ME/2000/XP, Linux

3.3.1 The I-7563 System Network Configuration:

- Multiple Baud Rate
- Multiple Data Format



3.3.2 The I-7563 Block Diagram:



3.3.3 I-7563 Driver Installation

This section will guide you on how to install the I-7563 USB to 3 Ports RS-485 Hub under Windows XP, Windows 2000, Windows ME, and Windows 98 operating systems. (No support for WinNT). Download driver files from

1. Package CD, \Napdos\7000\756x\7563
2. ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/7000/756x/7563

The following steps will show how to install the device under Windows 2000. Basically, the procedures are also somewhat the same for other Windows operating systems.

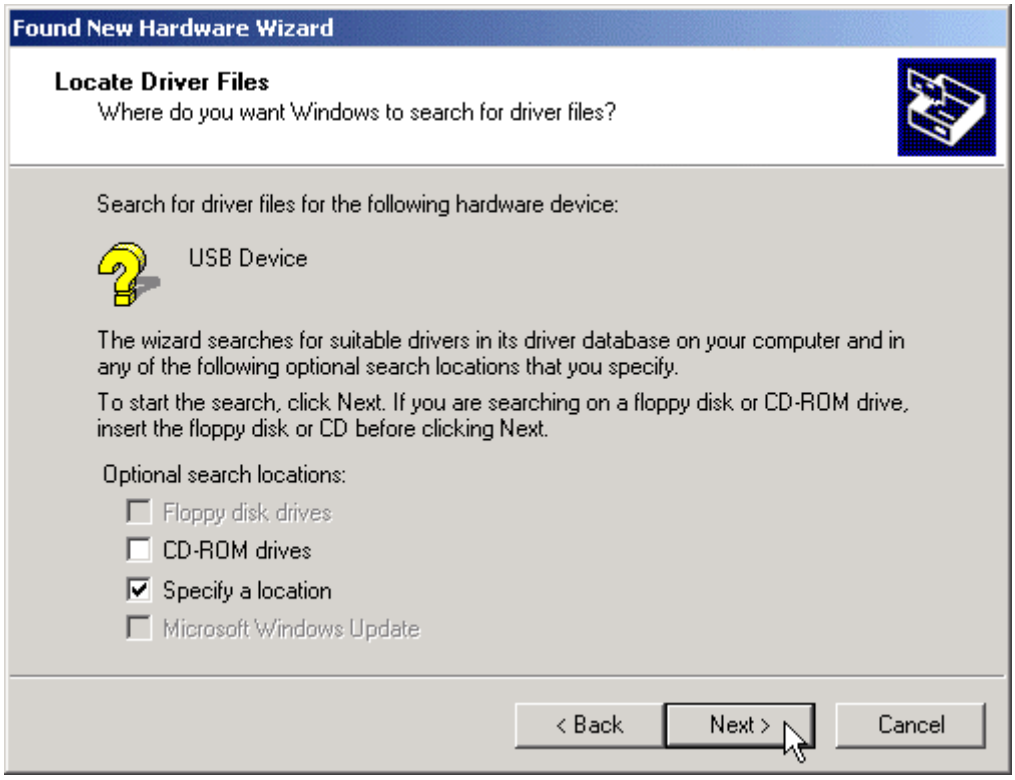
1. Power on your computer and boot to Windows.
2. Locate the USB port of your computer and plug in the I-7563.
3. Windows will detect the new device and will initiate the Found New Hardware Wizard prompting you to install the software for the detected USB Device. Select to install from a list or specific location. Click Next to continue.

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
This wizard helps you install a device driver for a hardware device.
To continue, click Next.
< Back
Next >
Cancel

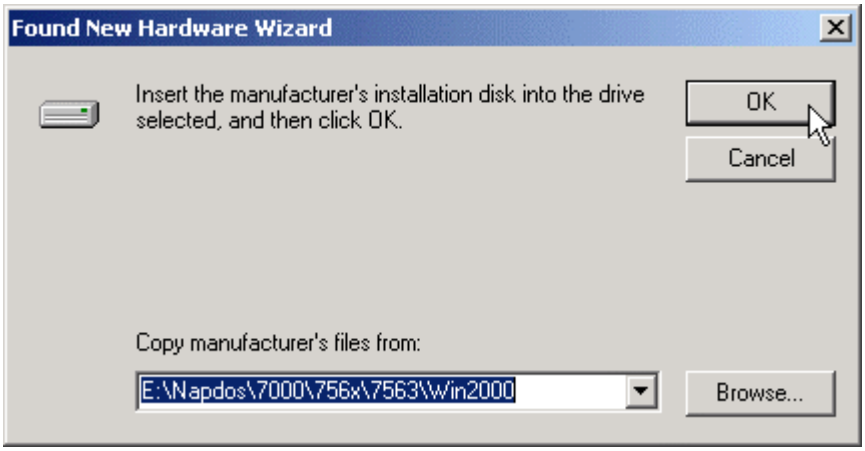
4. An “Install Hardware Device Drivers” window is shown. Click “Next” to initiate a search for a suitable driver for your device.

Found New Hardware Wizard
Install Hardware Device Drivers
A device driver is a software program that enables a hardware device to work with an operating system.
This wizard will complete the installation for this device:
USB Device
A device driver is a software program that makes a hardware device work. Windows needs driver files for your new device. To locate driver files and complete the installation click Next.
What do you want the wizard to do?
Search for a suitable driver for my device (recommended)
Display a list of the known drivers for this device so that I can choose a specific driver
< Back
Next >
Cancel

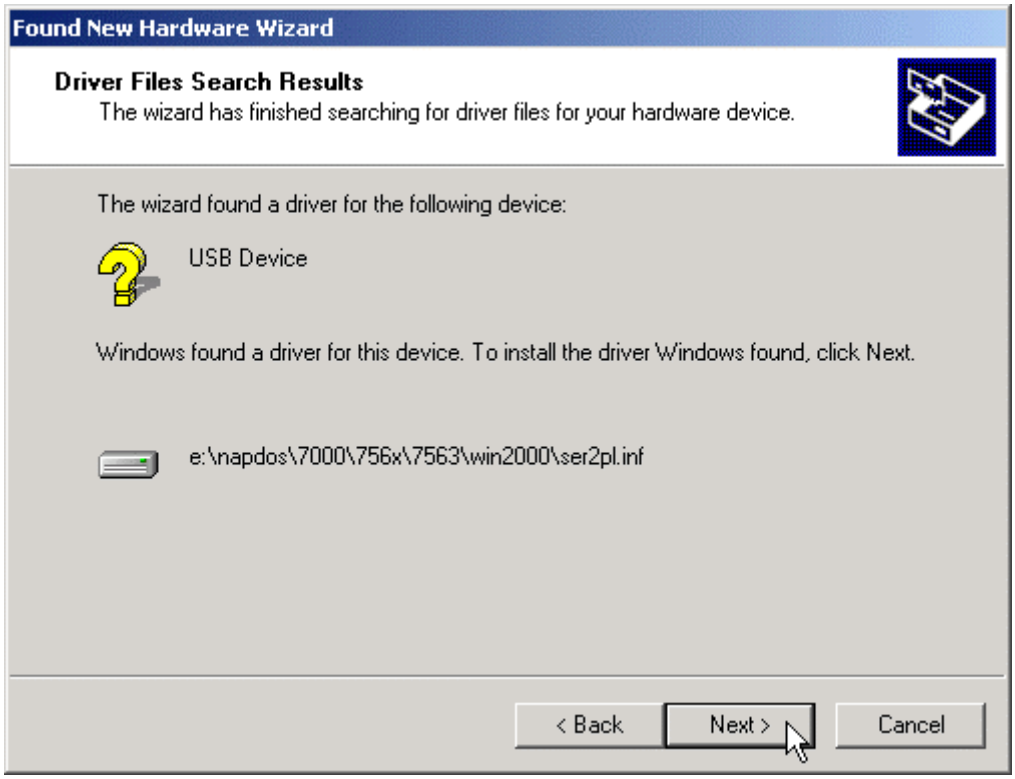
5. Select the “Specify a location” optional search locations. If the “CD-ROM drives” checkbox is selected, please insert the driver CD. Click “Next” to start the search.


Found New Hardware Wizard
Locate Driver Files
Where do you want Windows to search for driver files?
Search for driver files for the following hardware device:
USB Device
The wizard searches for suitable drivers in its driver database on your computer and in any of the following optional search locations that you specify.
To start the search, click Next. If you are searching on a floppy disk or CD-ROM drive, insert the floppy disk or CD before clicking Next.
Optional search locations:
Floppy disk drives
CD-ROM drives
Specify a location
Microsoft Windows Update
< Back
Next >
Cancel

6. If the “Specify a location” is selected, you much choose the correct path. Enter E:\Napdos\7000\756x\7563(The ‘E’ is the Disk that Package CD put in). Click “OK” to start the search.



7. Once Windows finds the correct driver, click “Next” to install the driver.


Found New Hardware Wizard
Driver Files Search Results
The wizard has finished searching for driver files for your hardware device.
The wizard found a driver for the following device:
USB Device
Windows found a driver for this device. To install the driver Windows found, click Next.
e:\napdos\7000\756x\7563\win2000\ser2pl.inf
< Back
Next >
Cancel

8. Windows will then install the driver for the USB-to-3 Ports. Once installation is complete, Windows will notify you that it has finished installing the software. Click “Finish” to continue.

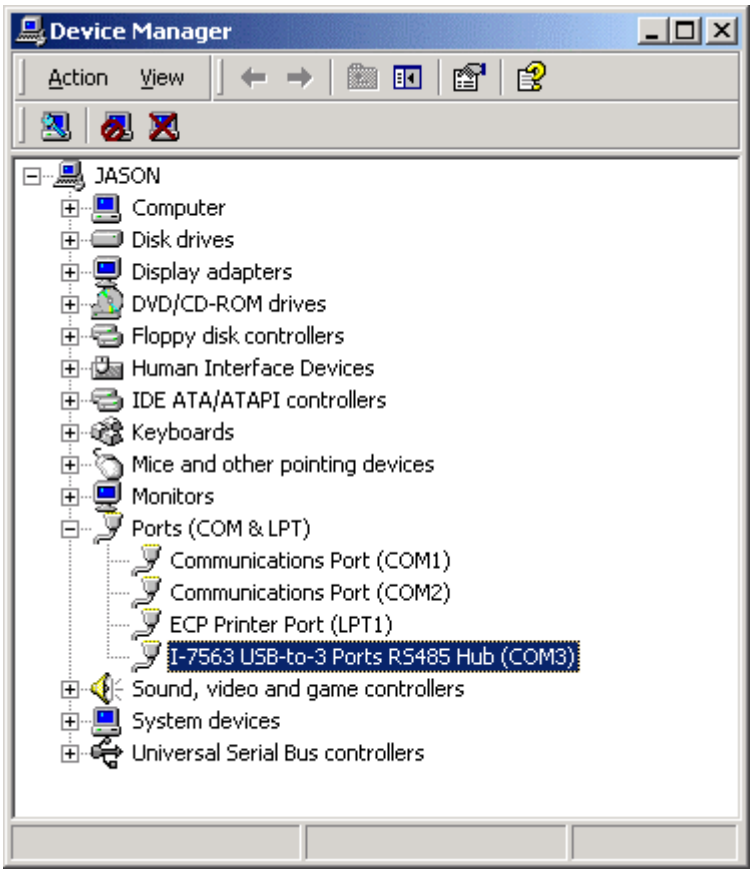
Found New Hardware Wizard
Completing the Found New Hardware Wizard
I-7563 USB-to-3 Ports RS485 Hub
Windows has finished installing the software for this device.
To close this wizard, click Finish.
< Back
Finish
Cancel

3.3.4 Verifying the Installation:
This section will show you on how to verify whether the I-7563 was properly installed. You will also need to determine the COM port assignment made by Windows for the USB to 3 Ports RS-485 Hub.

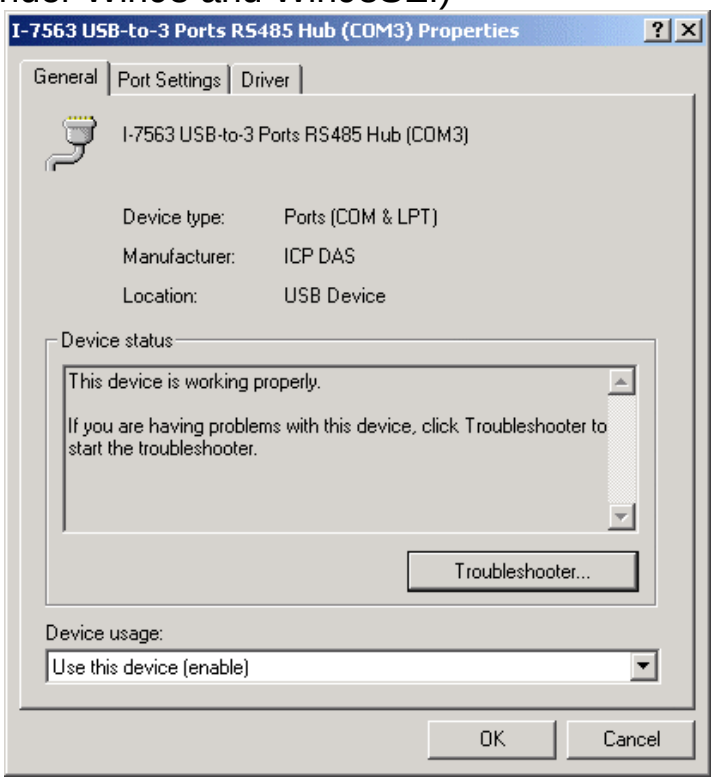
Note: Before you connect the I-7563 for the first time, ensure that you do not attach any serial devices to the converter. You must only connect the I-7560 itself.

To verify whether the device is properly installed and determine the COM port assignment for the device:

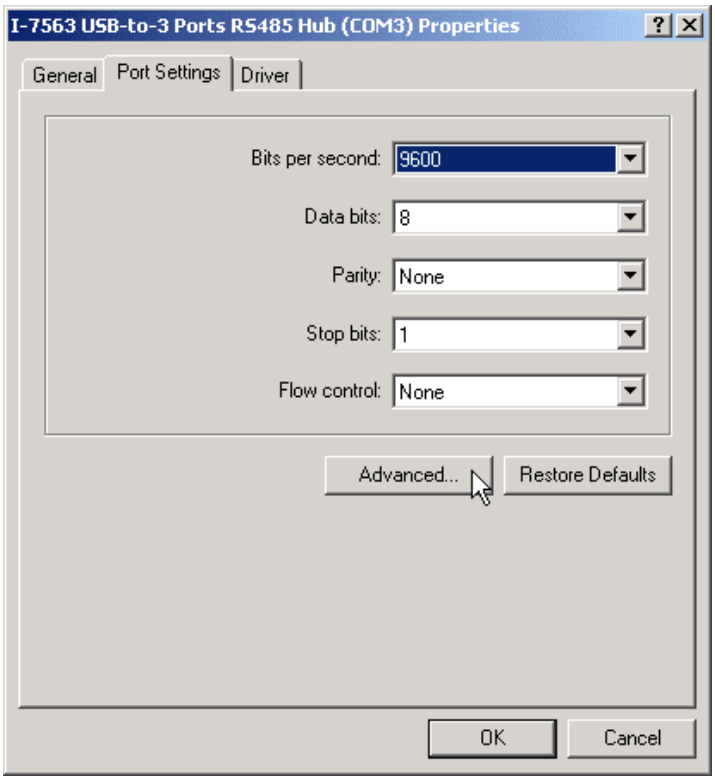
1. Click "Start" → "Settings" → "Control Panel", then double click on the "System" icon. Once the System Properties window is display, click on " Hardware" tab and then click on the "Device Manager" button. Double-click on Ports (COM & LPT). If the device was correctly installed, you should now see the I-7563 USB-to-3 Ports RS485 Hub (COM3) device listing. This also means that Windows has assigned the device to the COM3 port.



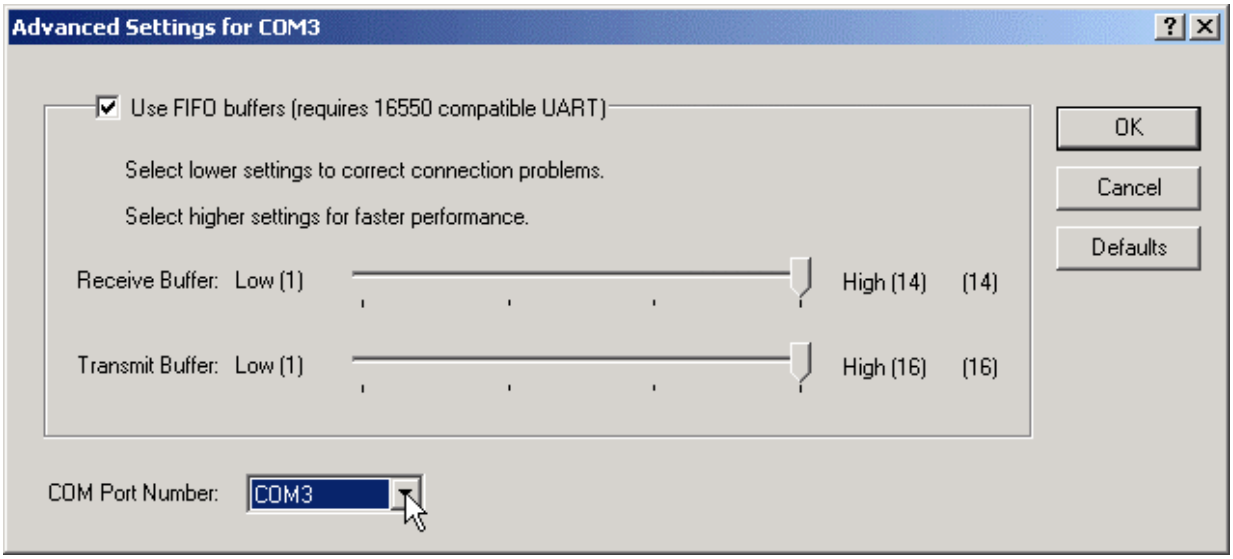
2. If you need to assign the COM Port name to another Port number, you can double-click on the device (I-7563 USB-to-RS485 Hub) to view the properties. (The I-7561 cannot reassign the COM Port name to another Port number under Win98 and Win98SE.)



3. Once the properties window opens click on the Port Settings tab. Then click on the advanced button.



4. The Advanced Settings dialog box will now be displayed. Click on the COM Port Number drop down box to check what other port numbers are available. If, for instance, Windows has assigned COM5 to the device, you may try to reassign it to a lower unused port number. Click OK when finished. Try running HyperTerminal to test whether the new port number is OK.



Note: Some software programs may only support Ports up to COM4 and may not work if the port is assigned to COM5 or higher.

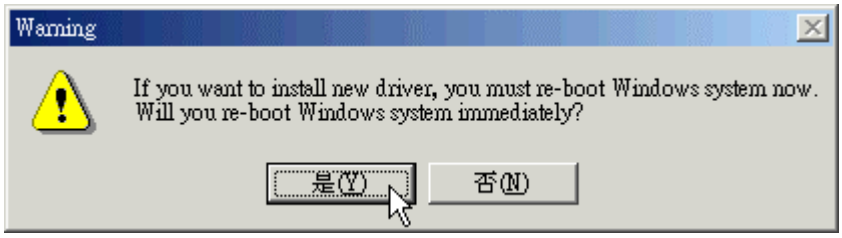
5. Once you have verified that the device has been properly installed, you may now proceed to use the USB-to-3 Ports RS485 Hub to connect to serial devices. Attach the serial device to the serial port of the adapter and then connect the USB connector to the USB port of your computer. Use the supplied driver for the serial device if needed.

3.3.5 Uninstalling the Device Driver

It is easy to uninstall the USB to Serial device driver:

1. Run the DRemover98_2K.exe Uninstall program which can be found on the Package CD, \Napdos\7000\756x\7563 or at ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/7000/756x/7563
2. The uninstall program will then prompt you if you want to remove the utility program. Click OK to continue.

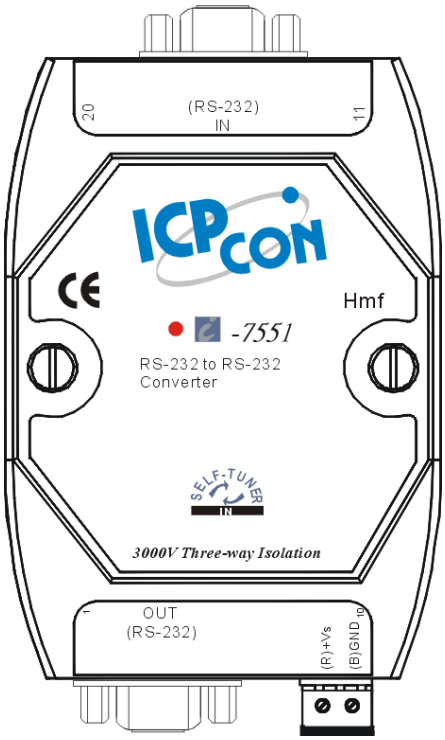
3. After the uninstall is complete, the program will prompt you to restart Windows. Click “Yes” to continue.


Warning
If you want to install new driver, you must re-boot Windows system now.
Will you re-boot Windows system immediately?
是(Y)
否(N)

4. Windows will show a dialog box to notify you that the driver was removed successfully. Wait for Windows to restart your computer.

4. I-7551 : RS-232 to RS-232 Converter

4.1 I-7551 Pin Assignment and Specifications:



Introduction

The **I-7551** Photo coupler provides a complete full-duplex (including control signal) electrical isolation channel between two RS-232 devices. This isolation is an important consideration if a system uses different power sources, has noisy signals or must operate at different ground potentials.

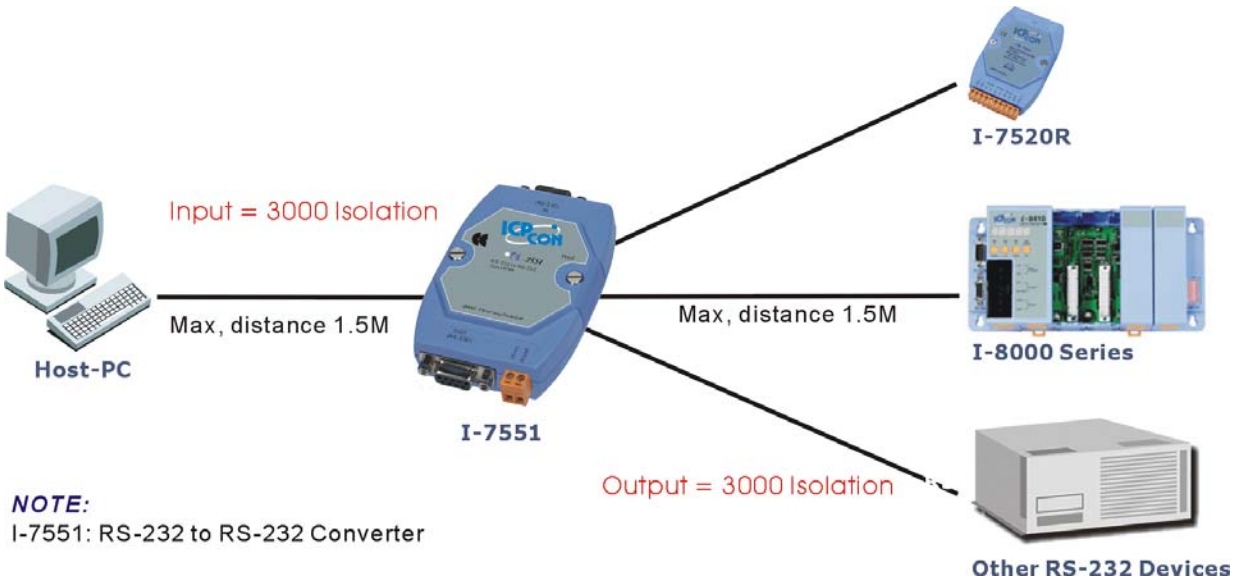
The **I-7551** has the option of reconfiguring which control signal is used. CTS can be selected instead of DSR and RTS instead of DTR. The **I-7551** incorporates two DC-to-DC converters; the isolation site of **I-7551** is located in the input and output interface circuit. In other words, **I-7551** is three- way isolation RS-232-to-RS-232 converter.

Specifications

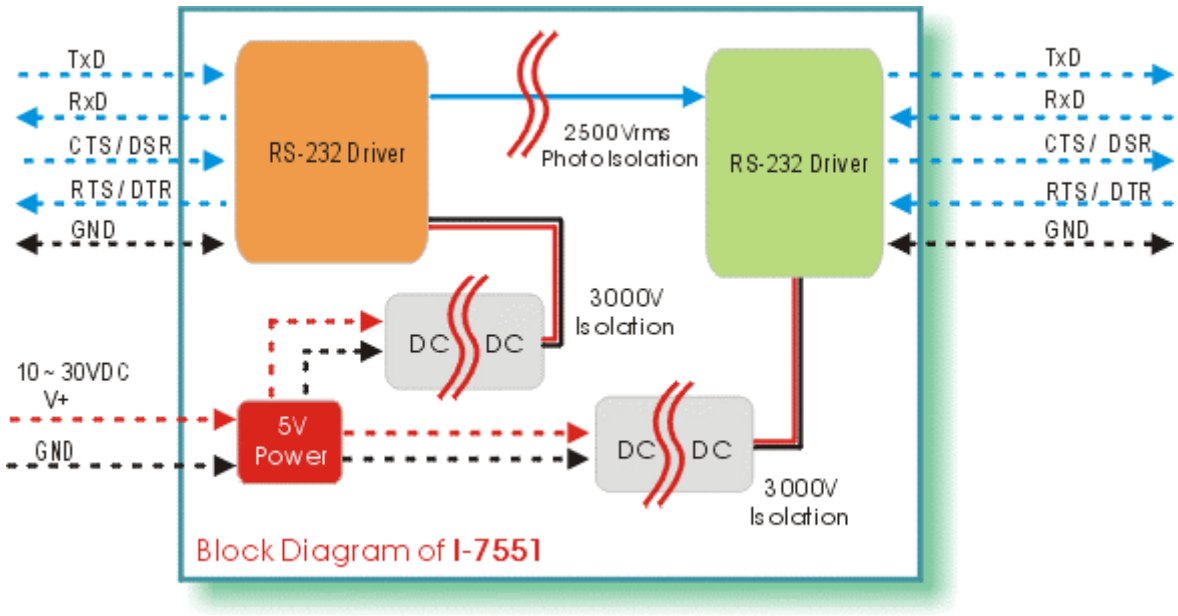
- **Input**:
  RS-232 (TxD, RxD, CTS, RTS, GND or TxD, RxD, DSR, DTR, GND)
- **Output**:
  RS-232 (TxD, RxD, CTS, RTS, GND or TxD, RxD, DSR, DTR, GND)
- **Three-way** Isolation voltage: 3000VDC
- Optical isolation: 2500V rms
- Power requirements: +10V dc ~ +30V dc
- Power consumption: 1.5 W max.
- Storage temperature: -25℃ to +75℃
- Humidity: 5~ 95%

4.1.1 The I-7551 System Network Configuration:

- Multiple Baud Rate
- Multiple Data Format



4.1.2 The I-7551 Block Diagram:

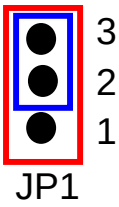


4.1.3 I-7551 has two different output types.

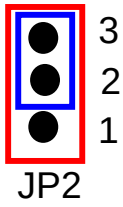
Selecting the I-7551 output type.
NOTE: The type1 and type2 couldn't be used simultaneously, which means that you can only select 1 type to output.

Type 1:
Input : TxD, RxD, CTS, RTS, GND. **Output :**TxD, RxD, CTS, RTS, GND.
Type 2:
Input : TxD, RxD, DSR, DTR, GND. **Output :** TxD, RxD, DSR, DTR, GND.

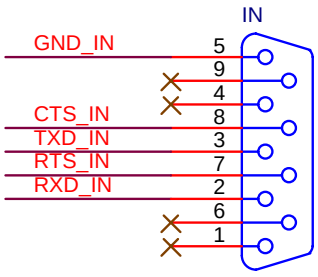
Type1 and Type2 Jumpers settings:
NOTE: RXD and TXD are permanent setting.
For type 1: Set the JP1 jumper to positions 2 and 3.
Set the JP2 jumper to positions 2 and 3.



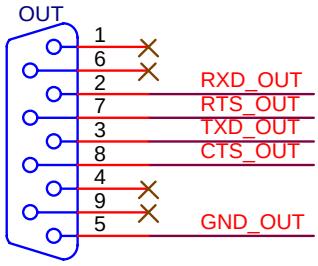
Type 1:
For Pin8 "CTS"
Default setting



Type 1:
For Pin7 "RTS"
Default setting

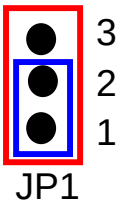


DB9_Female

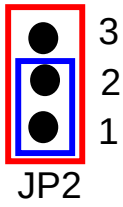


DB9_Male

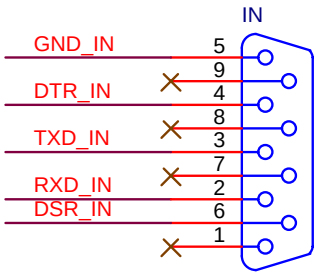
For type 2: Set the JP1 jumper to positions 1 and 2.
Set the JP2 jumper to positions 1 and 2.



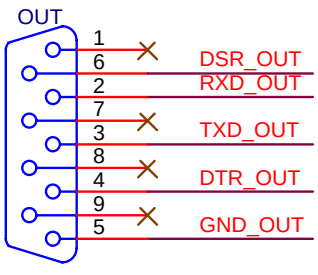
Type 2:
For Pin6 "DSR"
Default setting



Type 2:
For Pin4 "DTR"
Default setting



DB9_Female

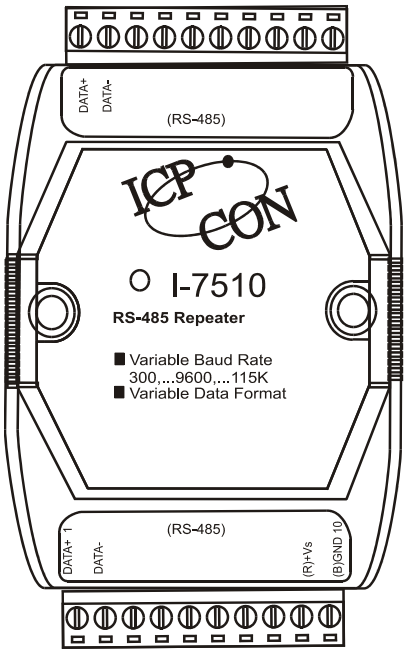


DB9_Male

5. Repeater series: I-7510 / I-7510A / I-7510AR / I-7513

5.1 I-7510:

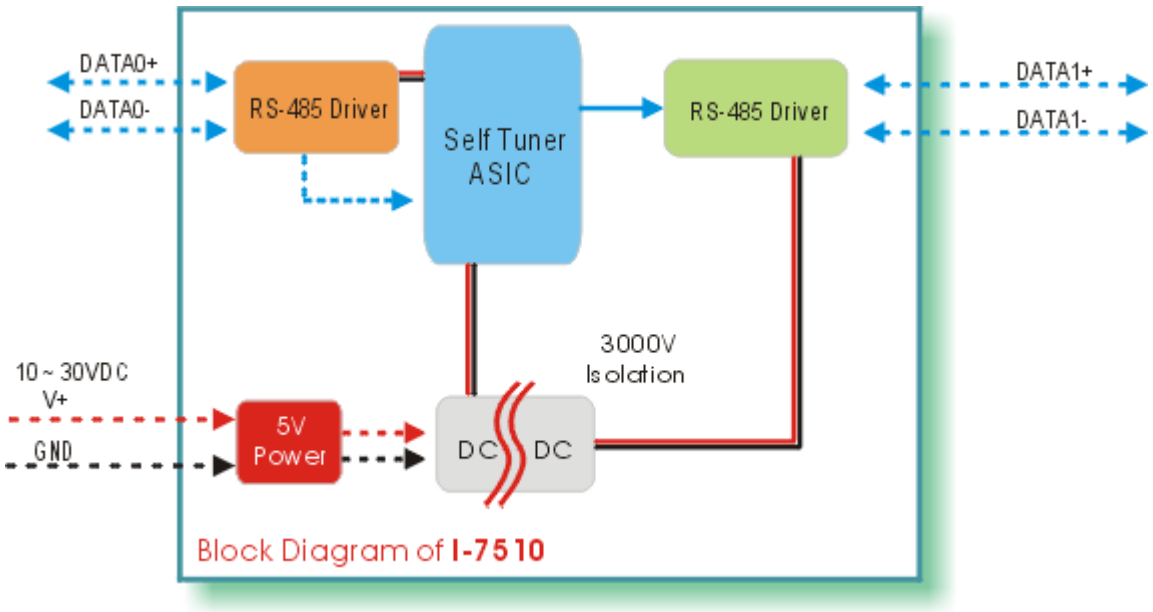
5.1.1 Pin Assignment and Specifications:



7510: RS-485 Repeater

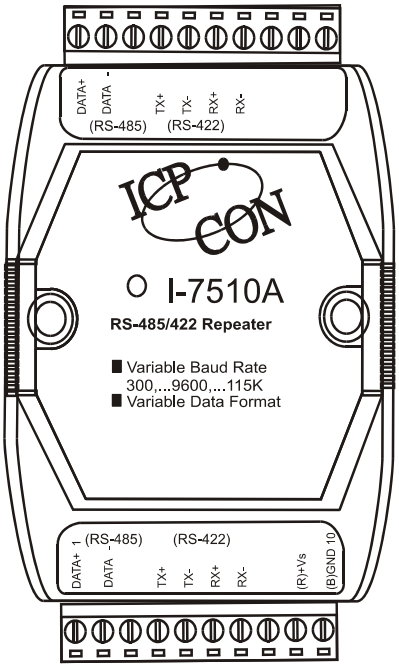
- Input: two-wire RS-485, (D+, D-)
- Output: two-wire RS-485, (D+, D-)
- Speed: “Self Tuner” inside, auto switching baud rate, from 300 to 115200 BPS
- Isolation voltage: 3000V
- Connector: plug-in screw terminal block
- Power requirements: +10V dc ~ +30V dc
- Power consumption: 2.2W(Max)

5.1.2 Block Diagram:



5.2 I-7510A:

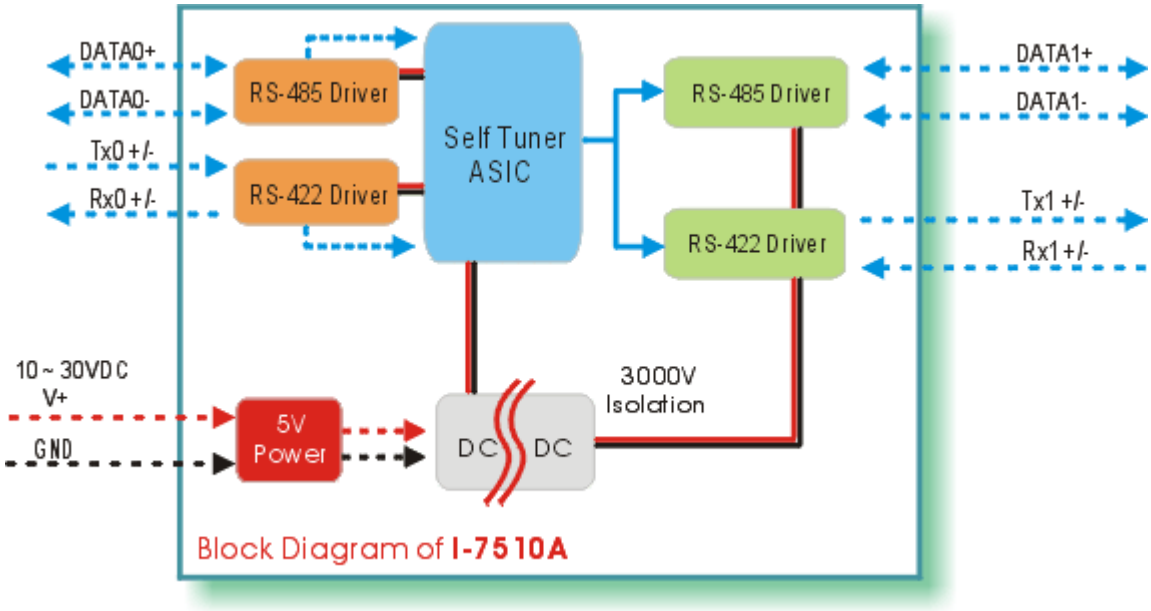
5.2.1 Pin Assignment and Specifications:



7510A: RS-485/RS-422 Repeater

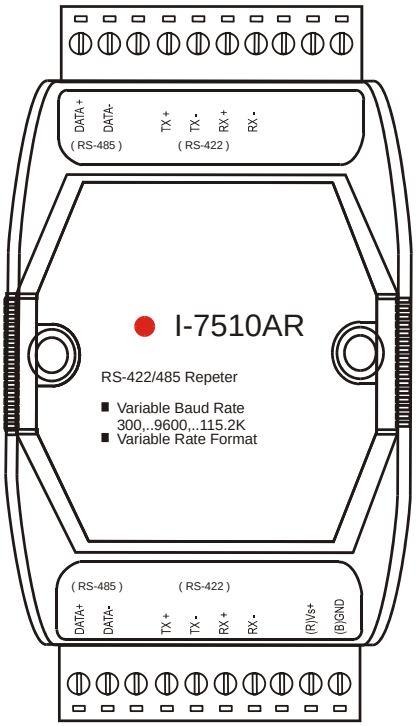
- Input: RS-485/RS-422
- Output: RS-485/RS-422
- Speed: "Self Tuner" inside, auto switching baud rate, from 300 to 115200 bps
- Isolation voltage: 3000V
- Connector: plug-in screw terminal block
- Power requirements: +10V dc ~ +30V dc
- Power consumption: 2.2W(Max)

5.2.2 Block Diagram:



5.3 I-7510AR:

5.3.1 Pin Assignment and Specifications:



Introduction

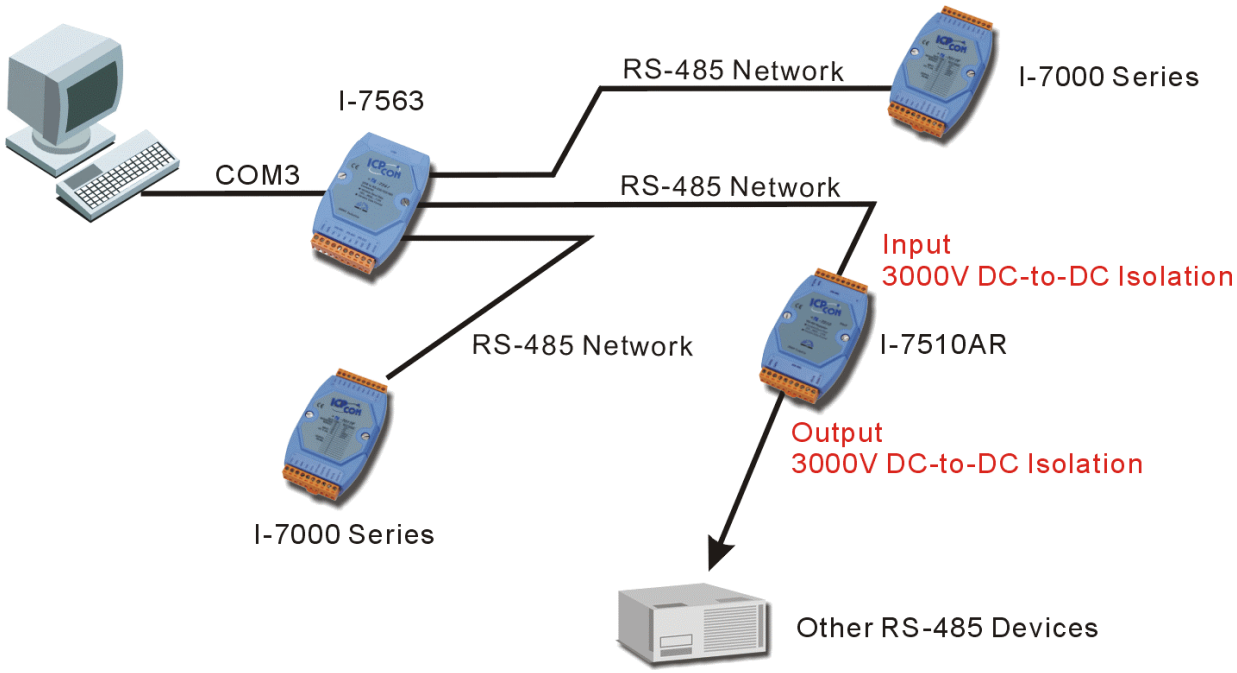
I-7510AR is exactly the same as I-7510A except for the isolation site, The isolation site of I-7510A is located in the input interface circuit, but the isolation site of the I-7510AR is located in the input and output interface circuit. In other words, I-7510AR is **three- way** isolation repeater module.

Specifications

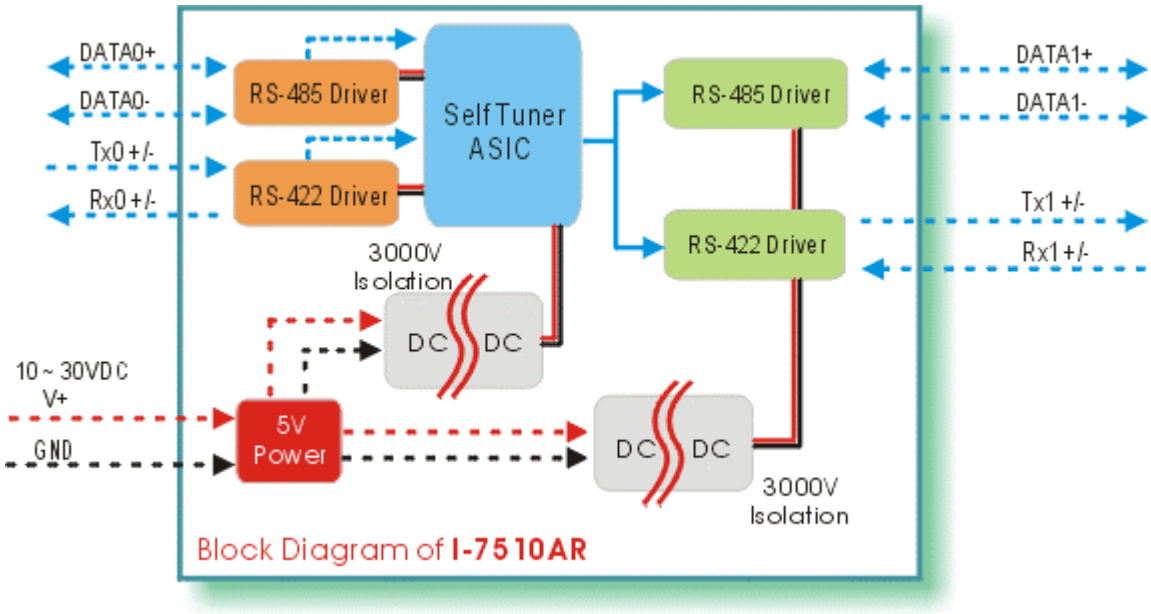
- Input: RS-485/RS-422
- Output: RS-485/RS-422
- Speed: “Self Tuner” inside, auto switching baud rate, from 300 to 115200 bps
- Isolation voltage: Three-way 3000Vdc
- Connector: plug-in screw terminal block
- Power requirements: +10V to +30VDC
- Power consumption: 2.2W(Max)

5.3.2 System Network Configuration:

- Multiple Baud Rate
- Multiple Data Format

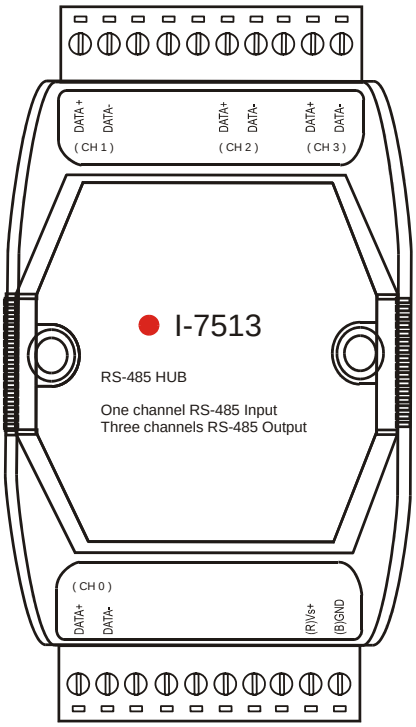


5.3.3 Block Diagram:



5.4 I-7513:

5.4.1 Pin Assignment and Specifications:



Introduction

I-7513 is 3-Channel RS-485 Active Star Wiring Hub. The unit has 3 independent RS485 output channels each with their own driver, which can transmit signals along 4,000 ft (1.2Km). Of cable on each channel.

I-7513 includes both Hub and Repeater function. So each output channel can be connected anther hub.

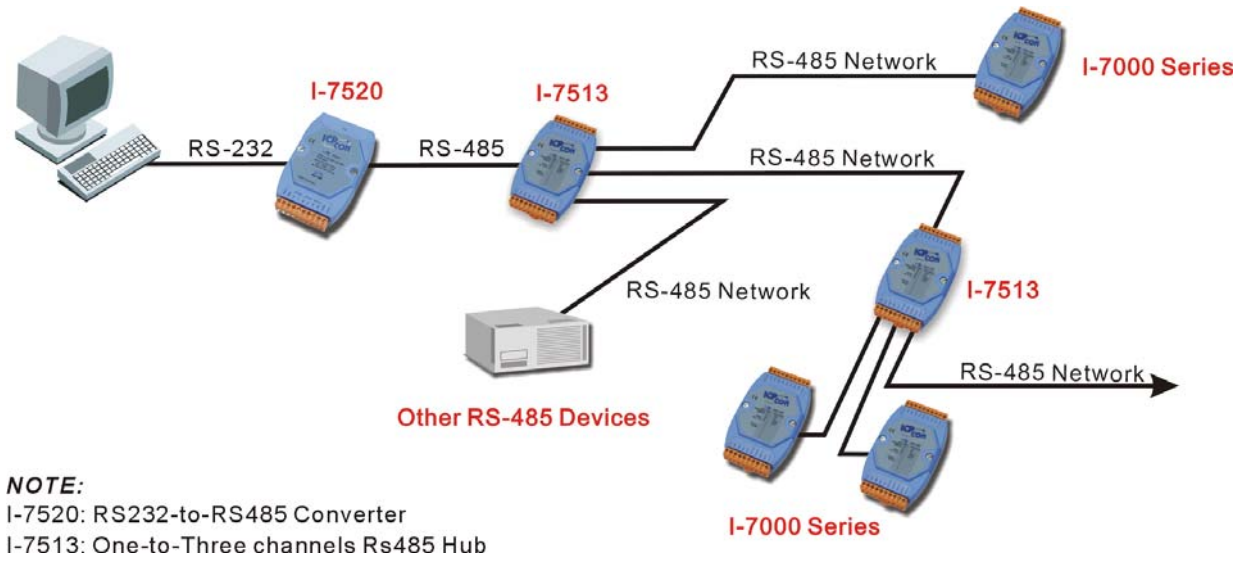
The isolation site of I-7513 is located in the input and output interface circuit. In other words, I-7513 is three- way isolation module.

Specifications

- Input: one port RS-485, (D+, D-)
- Output: three-port RS-485, (D+, D-)
- Speed: “Self Tuner” inside, auto switching baud rate, from 300 to 115200 bps
- Isolation voltage: Three-way 3000Vdc
- Connector: plug-in screw terminal block
- Power requirements: +10V dc ~ +30V dc
- Power consumption: 2.2W(Max)
- Each channel on the hub is driven by it's own RS-485 driver.
- Each channel maximum line length about of 4000 ft.

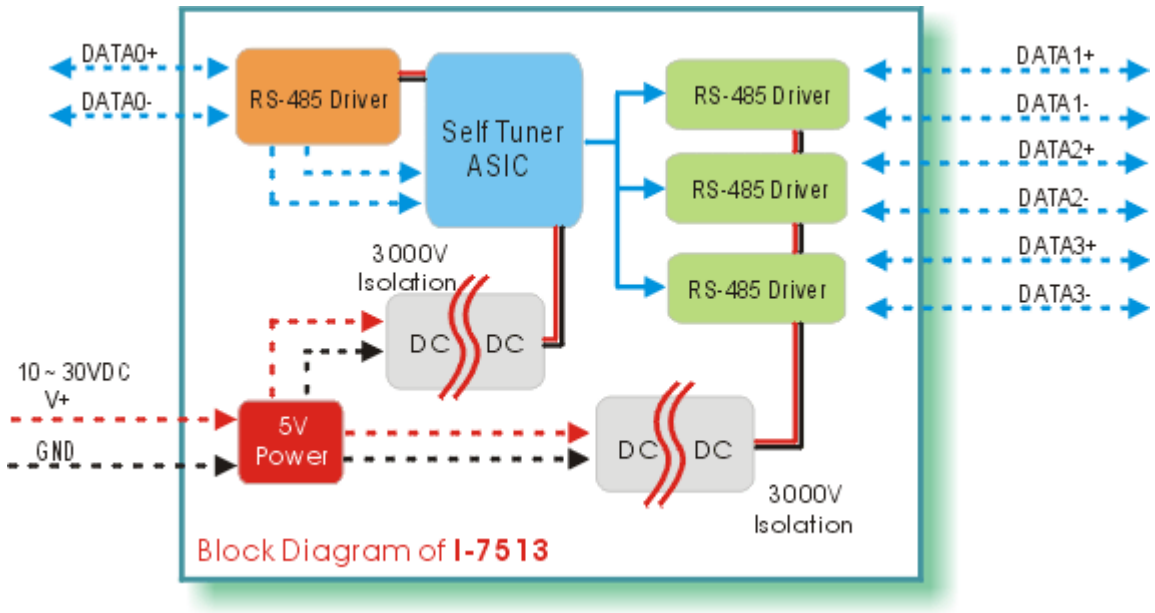
5.4.2 System Network Configuration:

- Multiple Baud Rate
- Multiple Data Format

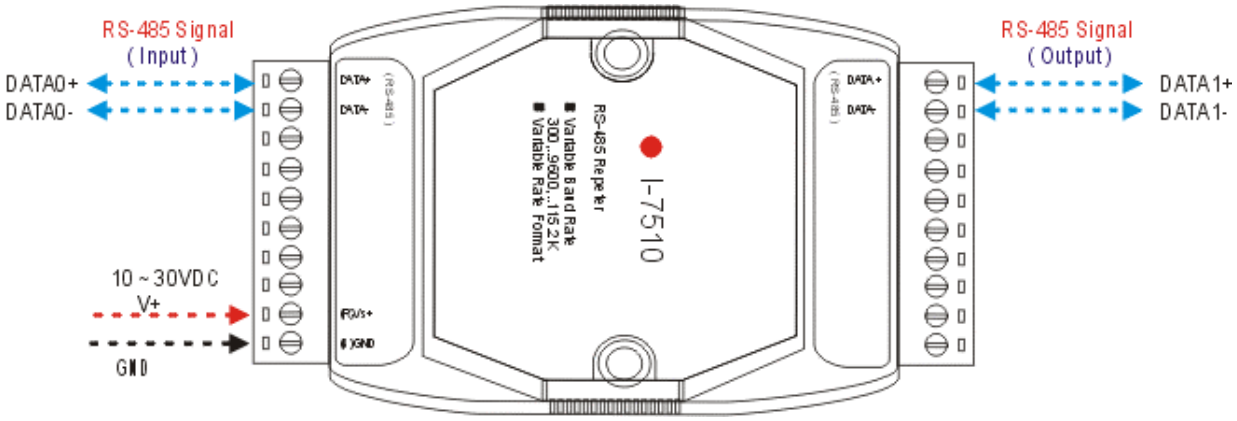


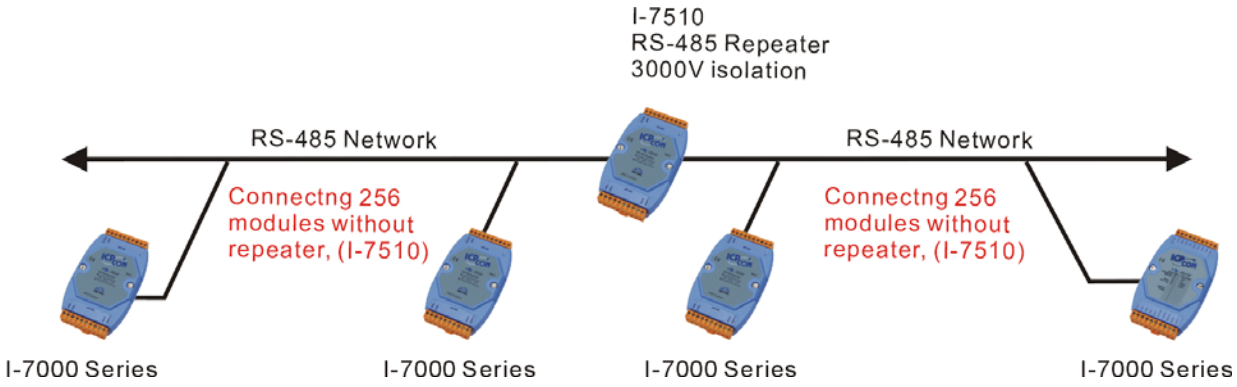
NOTE:
I-7520: RS232-to-RS485 Converter
I-7513: One-to-Three channels Rs485 Hub

5.4.3 Block Diagram:



5.5 Basic Wire Connections for I-7510



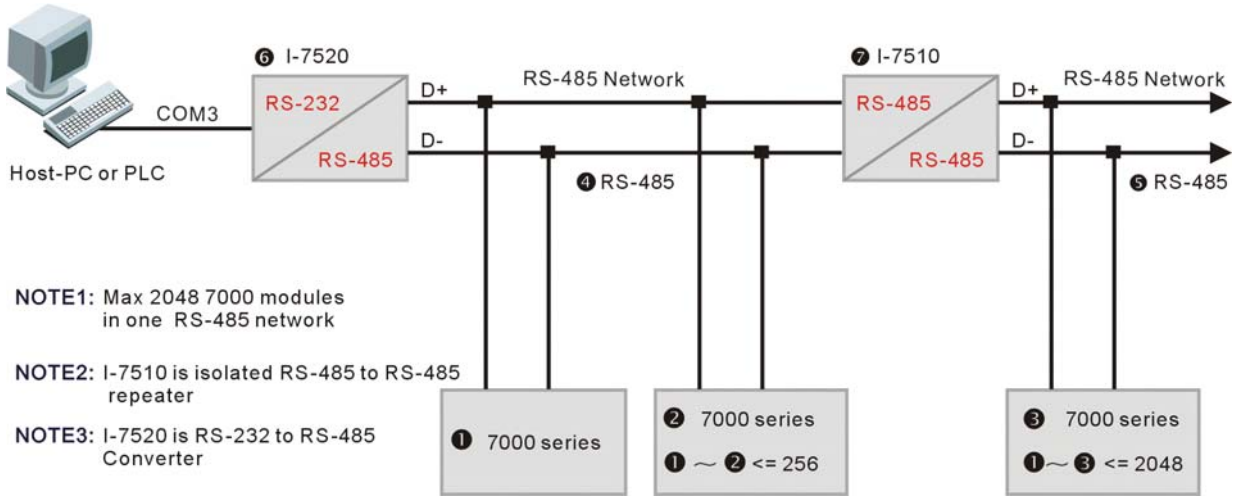


(1) Extends RS-485 network if the path is over 4000 ft or 1.2 Km
(2) Extends RS-485 network if connecting over 256 modules
(3) Cuts a long RS-485 path into several isolated short RS-485 paths for protection

6. 7000 RS-485 Networking

6.1 Standard/Isolation Configuration

Daisy-Chain Configuration.



The Host PC/PLC will send out a command string from its RS-232 port. The ❻7520 will convert these RS-232 signals into a RS-485 signal and isolate the host from ❹RS-485 network.

The 7000 series modules, including D/I, D/O, A/D, D/A, Timer/Counter and MMI modules, will be directly connected to ❹RS-485. These 7000 series modules can connect a max. Of 256 modules to the ❹RS-485 network without a repeater, the 7510. That it to say, there can be 256 modules from ❶7xxx to ❷7xxx. If there are over 256 modules, the repeater 7510 must be added to extend the ❹RS-485 to ❺RS-485. Then there can be another 256 modules connected to the ❺RS-485 network. This is the first function of the 7510.

The module address can be changed from 00 to FF a total of 256 max. Therefore there are maxes. Of 256 modules in one RS-485 network if all the modules communicate with the same speed.

(1) Because the 7000 can communicate with different baud rates in the same RS-485 network, the ❶7xxx, ❷7xxx and ❸7xxx can be communicated to HOST PC/PLC with a different baud rate.

(2) The 7000 series can be programmed to 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200,a total of 8 different speed.

(3) The 7000 modules can share the same module address if their baud rates are different. For example,

❶7xxx=module address 01, baud rate=1200

❷7xxx=module address 01, baud rate=9600
❸7xxx=module address 01, baud rate=115200
These three modules can share the same RS-485 network, generated by ❻7520.

(4) Therefore there is 256*8=2048 modules max. In one RS-485 network with a repeater (7510).

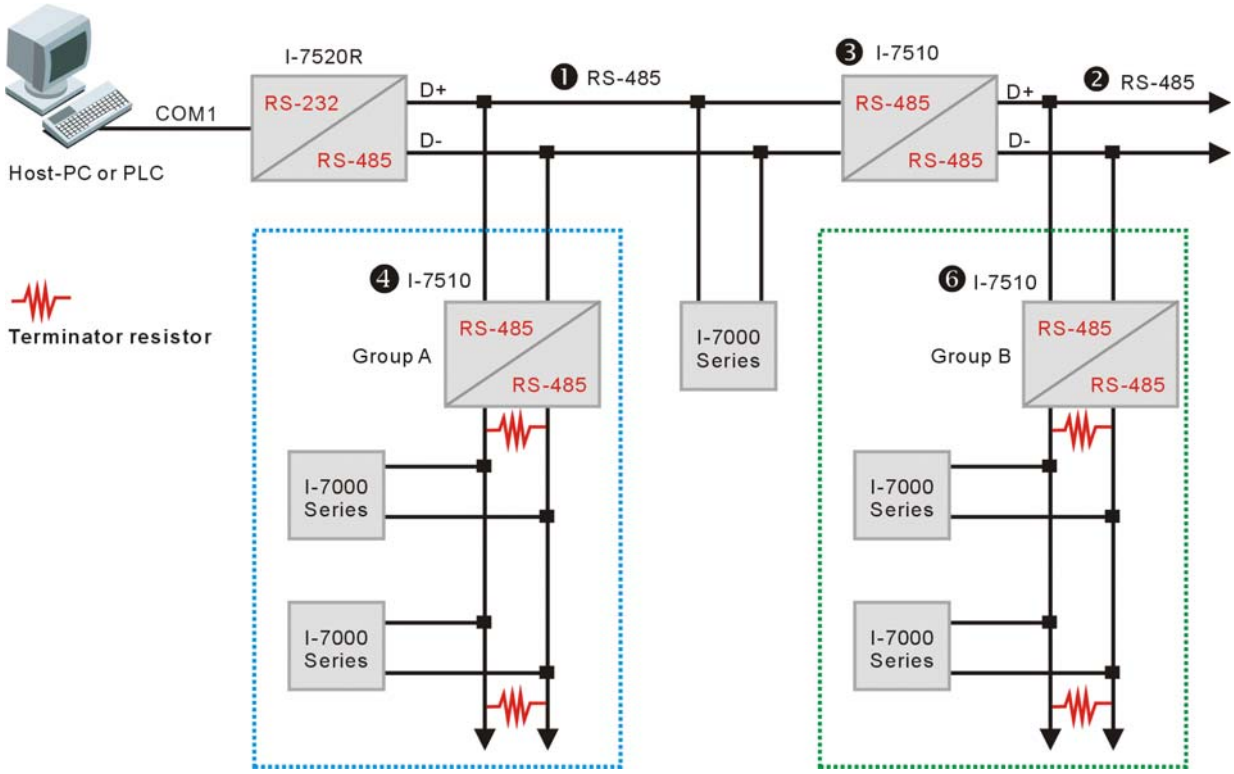
The "search function" given in NAP7000S can search for all these 2048 modules in one RS-485 network. Refer to "NAP7000S User Manual" for completely source listing of "search function".

When the RS-485 network is over 4000 ft or 1.2Km, the RS-485 repeater (7510) must be added to extend the RS-485 network. For example, if the ❹RS-485 is over 4000 ft or 1.2 Km, the ❼7510 must be added to extend ❹RS-485 to ❺RS-485. And if the ❺RS-485 is too long, the user should use another 7510 to extend another RS-485 network. This is the second function of 7510.

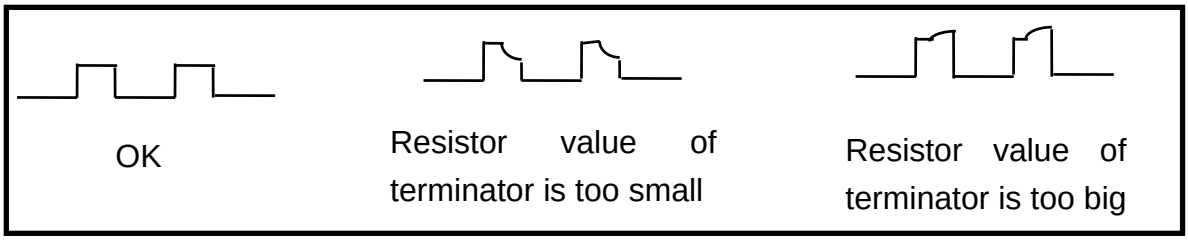
The power ground of the 7000 series is common ground to the RS-485 network. This feature is the same as the Adam 4000, Nudam 6000 and DATAFORTH 9B series. Therefore all the modules in the same RS-485 network are common ground. For example, the all modules between ❶7xxx and ❷7xxx share the same ❹RS-485 network and all are common ground. The ❹RS-485 length can be up to 4000 ft or 1.2 km, this is a very long path. This long path makes the RS-485 network very susceptible to network noise by high energy transient in this environment. If this noise is too great, all the modules in the RS-485 network may be damaged simultaneously. This is highly possible and occurs often in real world applications. It is strongly recommended to add another isolation repeater, the 7510, to break the long path RS-485 network into several short RS-485 networks to avoid all the modules being damaged at the same time. This is the third function of 7510.

For example, the ❹7510, ❻7510 are used to isolate local modules from ❶RS-485 network. If there is high energy transient on ❶RS-485 network, all the local modules will be safe.

Isolation Configuration (Strongly Recommended):



If the RS-485 network is not over 100 meters, the terminated resistors are not needed. However, it may be necessary to insert two terminated resistors at both end of the RS-485 segment. It is not easy to calculate the value of a terminator resistor. The best way to do this is to use an oscilloscope to check the RS-485 signal directly. If the impedance match of RS-485 network is OK, the oscilloscope will show a very nice square wave. If these square wave signals are distorted, the user will need to insert two terminators at both end of the RS-485 segment.



It is recommended to use the “trial and error” rule. The trial and error rules are given as follows:

(1) If the length of RS-485 is about 1.2 Km, try 330Ω first

(2) Run TEST.EXE of NAP7000S
Select function_5, run continuously for at least 8 hours to make sure communication is OK.

(3) If function_5 finds many communication errors, use an oscilloscope to check the waveform. The waveform will tell you whether the terminator is too small or too big. Then adjust your terminator and run TEST.EXE again.

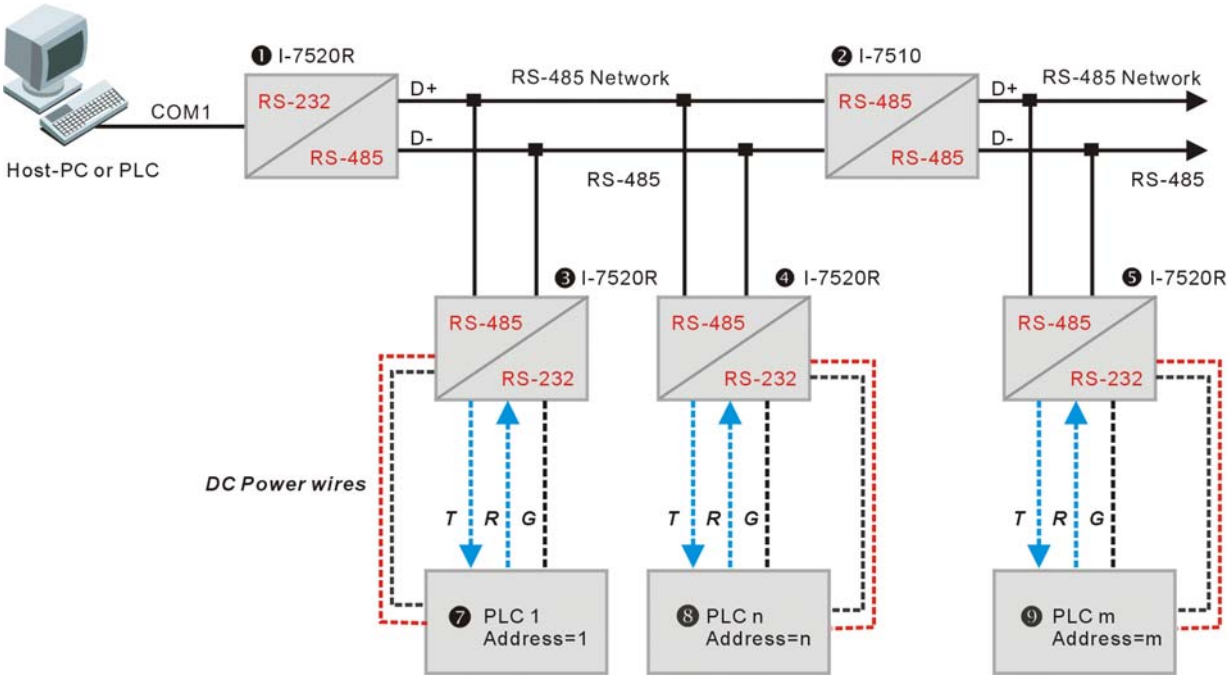
(4) If the correct terminators are found, run the TEST.EXE continuously for at least 8 hours to make sure there are no communication errors.

The function_5 of TEST.EXE, given in NAP7000S, will automatically read “testing command” from TEST.DAT and continuously perform “send-receive-testing”. It will continuously test and record all testing results. Therefore this function is especially designed for RS-485 network stability evaluation. If you run this function_5 continuously for 8 hours and find no check errors, this means that your RS-485 network is very stable. Also this means that your terminators match well now.

NOTE 1: The value of the terminator depends on the RS-485 wire used. If the RS-485 path is very long, don’t use a cheaper wire. It is recommended to select a high quality wire such as the Belden 1583A.

NOTE 2: The terminator is different for various applications. Therefore we can’t provide a terminator with the 7520 or the 7510. The user must choose the correct terminator by them self. It is recommended to use a carbon, 1/4w resistor.

6.2 PLC Networking Applications



These PLCs can be used at different baud rates & different configurations. For example,
PLC-1=1 start + 7 data + 1 stop=9-bit/byte, baud rate=1200
PLC-n=1 start + 8 data + 1 parity + 1 stop=11-bit/byte, baud rate=9600
PLC-m=1 start + 8 data + 1 parity + 2 stop=12-bit/byte, baud rate=115200

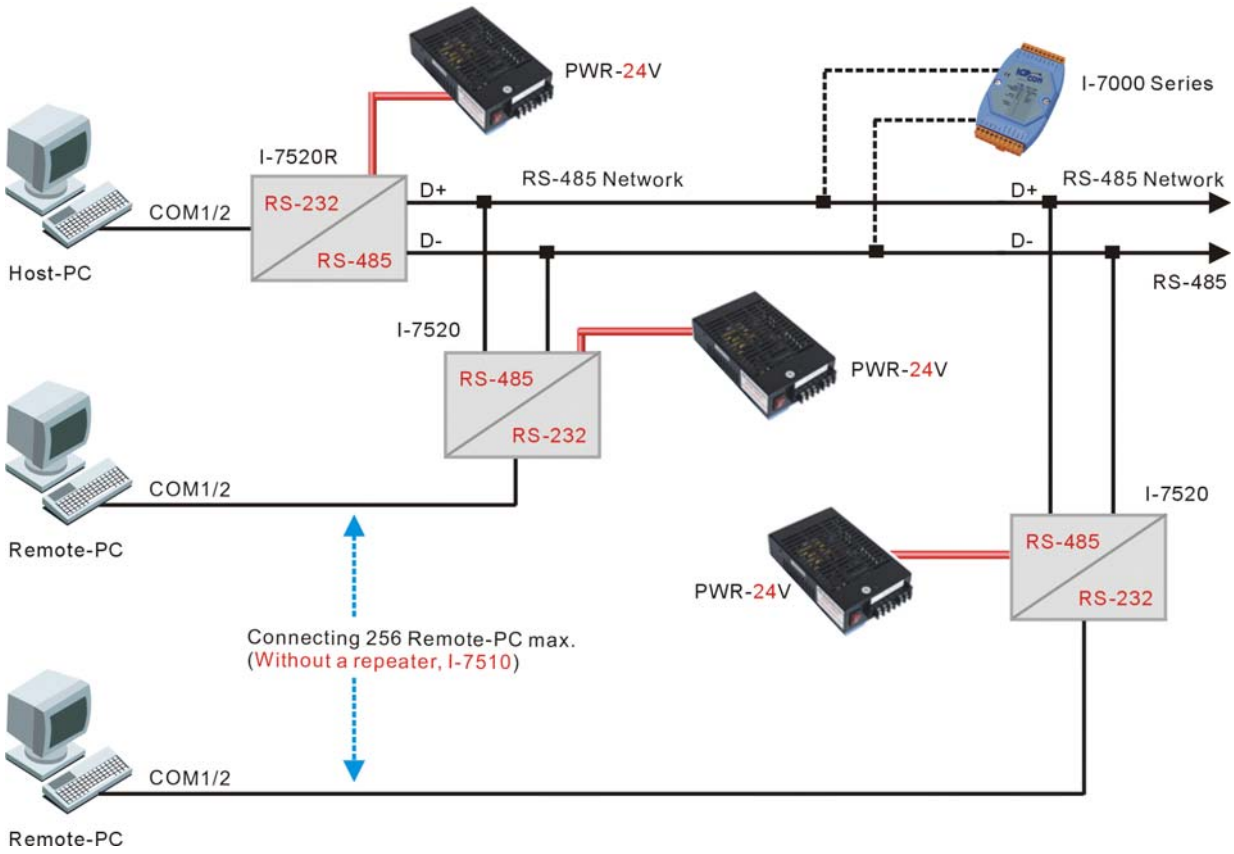
OMRON CQM1 = 1 start + 7 data + 1 even parity + 2 stop =11-bit/byte OMRON C200 = 1 start + 7 data + 1 even parity + 2 stop = 11-bit/byte

The ❶7520 can be the 7520 or 7520R, refer to Sec. 2.5 for details.

The ❸7520R, ❹7520R, ❺7520R can be the 7520 or 7520R, refer to Sec. 2.5 for details. In this configuration, the ❼PLC1, ❽PLCn, ❾PLCm provides DC power to ❸7520R, ❹7520R, ❺7520R. This is the cheapest to the 3000V high isolation. The user should not replace the 7520R, ❸, ❹, ❺, with the 7520.

Refer to “NAP7000S User Manual” for PLC networking software details.

6.3 PC Networking Applications

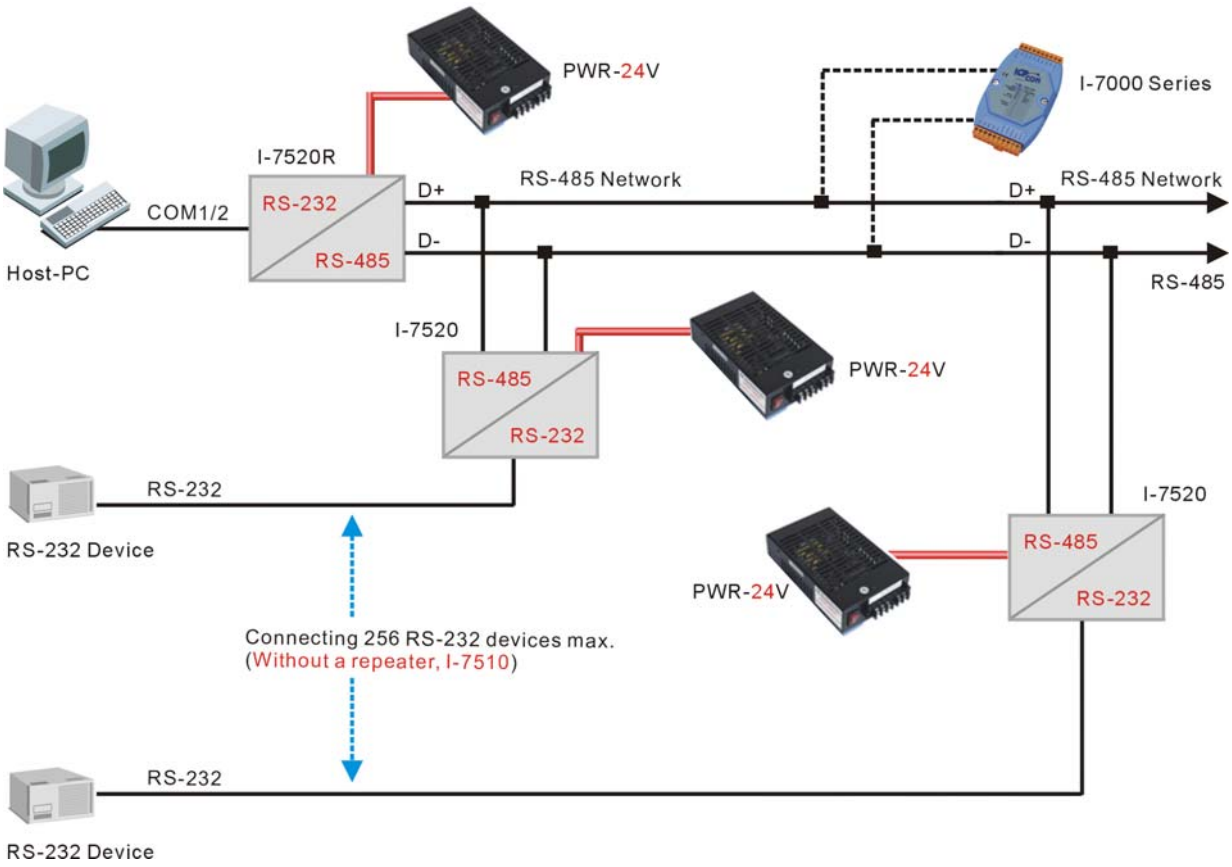


Every remote-PC must have a unique address. This unique address is similar to the module address of the 7000 series. We call it a "slave-PC address". The module address of the 7000 series is limited to 256, but the slave-PC address is unlimited. The user can connect thousands of PCs in one RS-485 network by using a repeater, the 7510.

Refer to "NAP7000S User Manual" for software details. Using this software, the host-PC can send out commands to remote-PCs, just like sending commands to the 7000 series modules. The remote-PC will receive these commands and execute the command if the destination addresses matches it's local address.

These remote-PC and 7000 series modules can use the same RS-485 network. The host-PC can send out the 7000 series commands and send out PC-networking commands at different times. The modules and remote-PCs will receive their command respectively. This makes the network very low cost, with high flexibility and reliability. This unique feature is not found elsewhere in the world.

6.4 RS-232 Devices Network



Some RS-232 devices can be connected to the 7000 RS-485 network very easily, just like the PC or PLC introduced in Sec 6.2 and Sec. 6.3. These RS-232 devices must adhere to 3 rules given as follows:

Rule 1: cannot send out the RS-232 signal in normal, operating state.
Rule 2: every device has a unique device address
Rule 3: will not send out a RS-232 signal if the destination address does not match with the device address

The software for RS-232 device networking and PLC networking is very similar. The only difference is the command format. The command format of PLC is always different for different manufacturers. Refer to “NAP000S User Manual” for software details.